THE OIL WEEKLY

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The Oil Man's Calendar

MAR.	
8–10	International Acetylene Association, Houston, Texas.
16–17	Southwestern District, American Petroleum Institute, Division of Production, San Antonio.
20–22	Western Petroleum Refiners Association, San Antonio, Texas.
21–23	Society of Exploration Geophysicists, Huckins Hotel, Oklahoma City.
22–24	American Association of Petroleum Geologists, Skirvin Hotel, Oklahoma City, Oklahoma.
APR.	
3–7	American Chemical Society, Baltimore, Maryland.
11	Pacific Coast District A. P. I. Division of Production, Los Angeles.
13–14	National Petroleum Association, Cleveland, Ohio.
18–19	Mid-Continent District, American Petroleum Institute Division of Production, Oklahoma City.
18–20	Southwest Gas Measuring Short Course, Norman, Oklahoma.
24–29	Oil-World Exposition, Houston, Texas.
MAY	
3–5	Petroleum Electric Supply Association, Houston, Texas.
3–5	Petroleum Industry Electrical Association, Houston, Texas.
3–5	Natural Gasoline Association of America, Tulsa, Oklahoma.
15–18	American Petroleum Institute, Mid-Year Meeting, New Orleans, Louisiana.
18–20	National Oil Scouts Association, Houston, Texas.
JUNE	
3	Illinois-Indiana Petroleum Association, Robinson, Illinois
15–16	Pennsylvania Grade Crude Oil Association, Hershey, Pa.

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This Week's Panorama

Brisk Activity of Petroleum Industry Throughout World Indicated for 1939, as Gains in Use and Production of Oil Appear Likely

As brought out in considerable detail in the various articles in this, the annual International Number of this publication, it is indicated that the petroleum industry will be relatively active throughout most of the world in 1939, following some slowing down in 1938 because of curtailed general business and industrial production.

Increases in 1939 in both consumption and production of petroleum appear quite likely; and consequently, aggressive field development and prospecting, for fulfilling the large requirements of oil, are to be expected.

New High in Oil Use Likely in 1939

It seems quite possible that the world demand for petroleum will reach a new all-time peak in 1939. The total demand even in 1938 was only about 7,000,000 barrels, or 3/10 of 1 percent less than the record consumption of 1937, despite a decrease of about 35,000,000 barrels, or 3 percent, in the United States. For the countries outside the United States used 28,000,000 barrels, or nearly 4 percent, more petroleum in 1938 than in 1937.

For 1939, an increase of possibly 5 percent in petroleum demand is expected in the United States, because of better business conditions, increased sales of automobiles, and the normal growth of consumption. And as in all other years recently, the trend of oil consumption abroad almost certainly will continue upward in 1939. Thus an increase in world use of oil appears fairly well assured.

Increase in Production Indicated

It is indicated, also, that world production of crude oil may reach a new high in 1939, in consequence of the anticipated large demand, although the output is under comparatively strict control and may fail to equal or exceed the record proportions of 1937.

Following the setting of the all-time record of 2,042,007,000 barrels in 1937, the world production of petroleum declined 3.3 percent in 1938. But that decline resulted largely from the material decrease of 5.2 percent in production in the United States, which regularly accounts for over 60 percent of the world output. Outside the United States, aggregate production was approximately the same in 1938 as in 1937.

For 1939, an increase in production in the United States appears almost certain, because of the expected gain in consumption, and the rise in output may be similar to that in demand. Outside the United States, the normal trend of production in recent years has been upward, and a resumption of that trend in 1939 appears likely, following the temporary flattening of the curve in 1938. Some increase in world production in 1939 is quite probable, therefore, although it remains to be seen whether or not the peak of 2,042,007,000 barrels reached in 1937 will be exceeded.

Petroleum continues to come largely from the fields of six countries, which in 1938 accounted for 90.6 percent of the world production; and no important changes in rank among the different countries are indicated for this year.

The United States remained far ahead of all other countries in 1938 in producing 61.4 percent of the world total; U. S. S. R. retained second place by producing 10.6 percent of the total; Venezuela was close behind and in third place with 9.5 percent of the world production; Iran ranked fourth, having yielded 3.8 percent; Netherlands India was fifth by furnishing 2.8 percent of the world output; and Roumania, having dropped during the year behind both Iran and Netherlands India, rated sixth among the sources of oil, with output equivalent to 2.5 percent of the world total.

World Reserves Equal 15-Year Supply

Although much information is available on petroleum reserves of the United States, similar information on the reserves of most other countries is limited. But a tabulation presented in this issue indicates that world reserves total approximately 30,900,000,000 barrels, equivalent to world requirements for about 15 years, at the current rate of consumption, amounting to 2,000,000,000 barrels annually.

Of the total reserves, the United States accounts

for 14,000,000,000 barrels, or 45 percent, and the rest of the world 55 percent. U. S. S. R. is credited with 5,000,000,000 barrels, or 16 percent of the world total; Iran 3,500,000,000 barrels, or 11 percent; Venezuela 2,500,000,000 barrels, or 8 percent; Netherlands India 1,600,000,000 barrels or 5 percent; and Iraq 1,500,000,000 barrels, also about 5 percent.

Engineers Solve Special Problems

The petroleum industry of the world continues to offer an exceptional outlet for the energy, initiative, and talent of engineers, geologists, and geophysicists.

The search for new oil fields never abates, and it spreads throughout the world.

Similarly, development of fields proceeds in all parts of the earth and under widely varying conditions.

And in so far as any prospecting or field development is unusual or difficult, it requires ingenuity and special effort on the part of the men conducting the work.

In this issue appear articles and information on some of the special conditions and problems encountered and successfully handled in the world-wide exploration and development.

Extensive World Drilling Likely

Comparatively active exploration and field development are in prospect throughout the world in 1939. A forecast offered by this publication in the issue of January 30, 1939, page 52, indicated a probable decrease of about 6 percent from 1938 in the number of well completions in the United States. But 1938 was a comparatively active year, and a small decrease would leave much field work. Drilling was active in most of the countries outside the United States in 1938, and it undoubtedly will continue so this year, as indicated in the surveys of developments in the various countries, presented in this issue.

Gasoline Stocks Above Maximum Desired Level

GASOLINE stocks went well beyond the level considered as representing the economic maximum desirable volume during the past week, as the rate of storage increase gained appreciably despite another reduction in crude runs to refinery stills.

Consequently, the outlook for the industry's markets became decidedly discouraging. Present indications are that prices in 1939 are to be confronted with the same depressing problems that existed in 1938, when markets suffered throughout the year from early excessive runs to refining stills and the resulting accumulation of surplus gasoline stocks.

Despite a fourth consecutive weekly reduction of runs to refinery stills, more gasoline went into stock tanks last week than in the preceding 7 days. As a result, stocks of gasoline on February 18, latest period for which statistics are available, stood at 83,075,000 barrels, as 2,125,000 barrels were made that could not find consumer demand. This compared with an increase of 1,800,000 barrels during the preceding week.

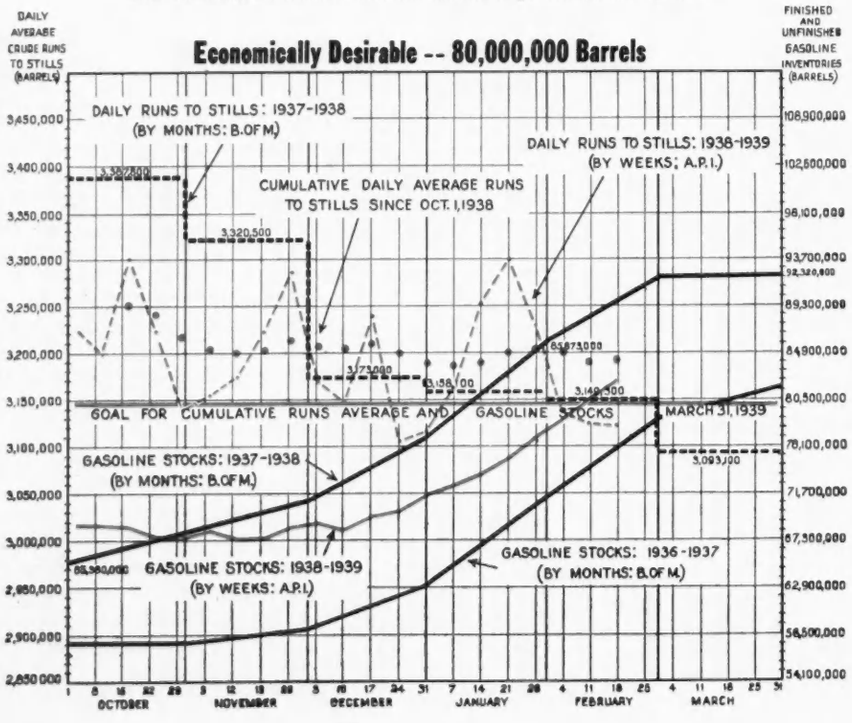
At this level, gasoline stocks were well above the 80,500,000 barrels that has been described by economists as the maximum economically desirable level for March 31, 1939. With 6 more weeks before arrival of that date, it now appears that gasoline stocks will total 90,000,000 barrels at that time. This is equivalent to the industry borrowing 10,000,000 barrels from the required gasoline production during the second and third quarters of the year.

Runs to stills during the week ended February 18 dropped another 5000 barrels to 3,125,000 barrels daily, but this curtailment still was not sufficient to offset bad weather, which slashed demand in many parts of the country.

Since January 1 of this year gasoline stocks have increased 11,350,000 barrels. Should the same rate of increase hold good for the next 6 weeks, gasoline stocks on March 31 would reach the 92,320,000-barrel level in existence at that time a year ago. However, it is possible for refiners to prevent the accumulation of so high a quantity. If they will continue to curtail runs to stills and good weather occurs, 90,000,000 barrels should be the absolute peak of gasoline stocks during 1939. It is certainly to be hoped that this is true.

The accompanying chart illustrates the trend of the gasoline situation since last October 1.

What Are Finished and Unfinished Gasoline Inventories Going to Be on March 31, 1939?



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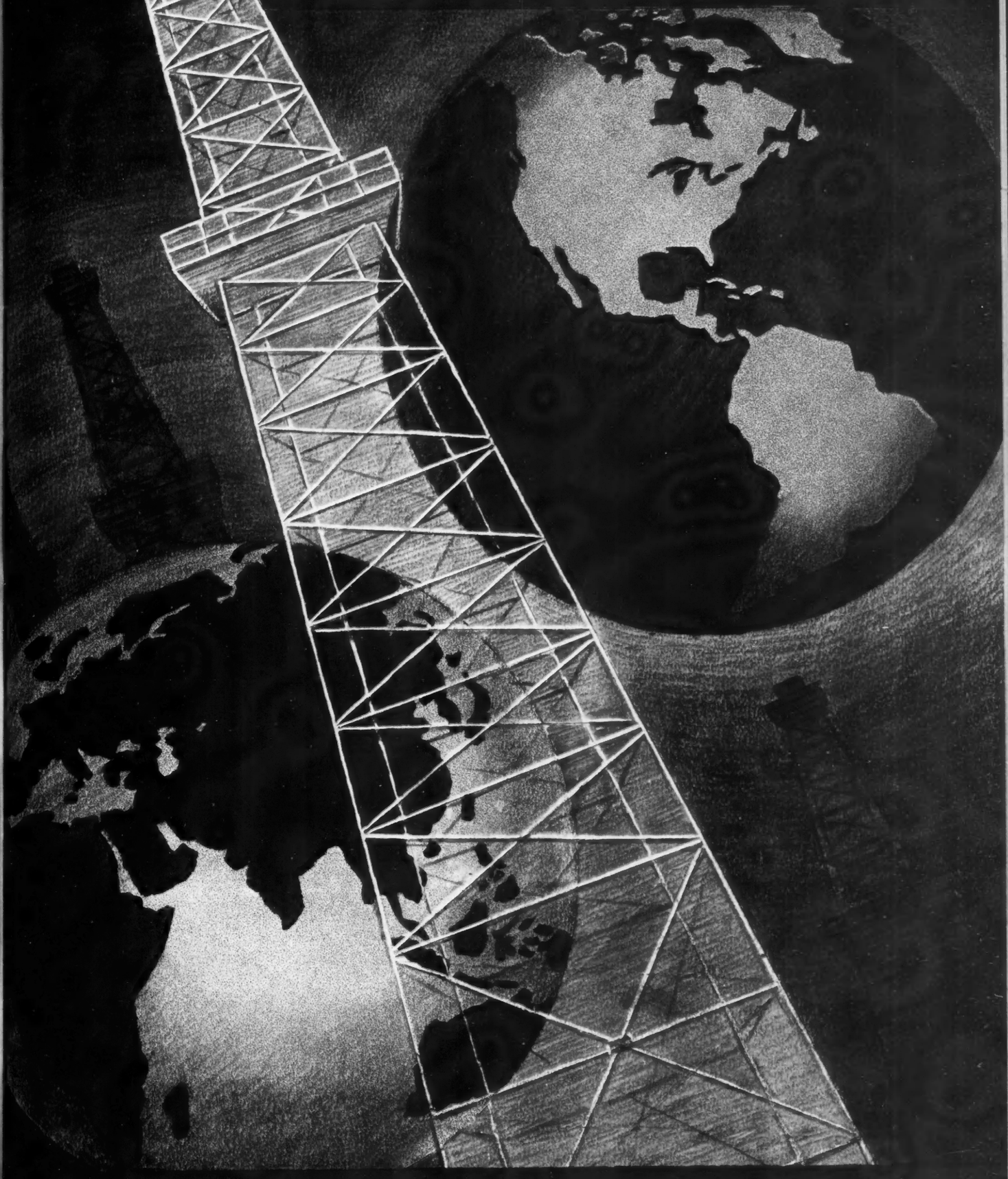

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Recent G.S.I. shots from COLOMBIA.

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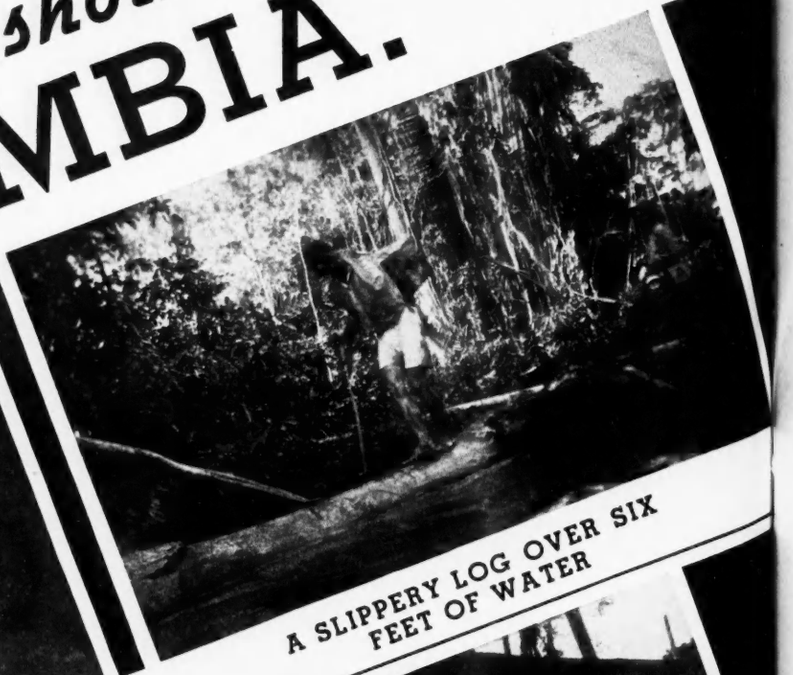

A SLIPPERY LOG OVER SIX FEET OF WATER

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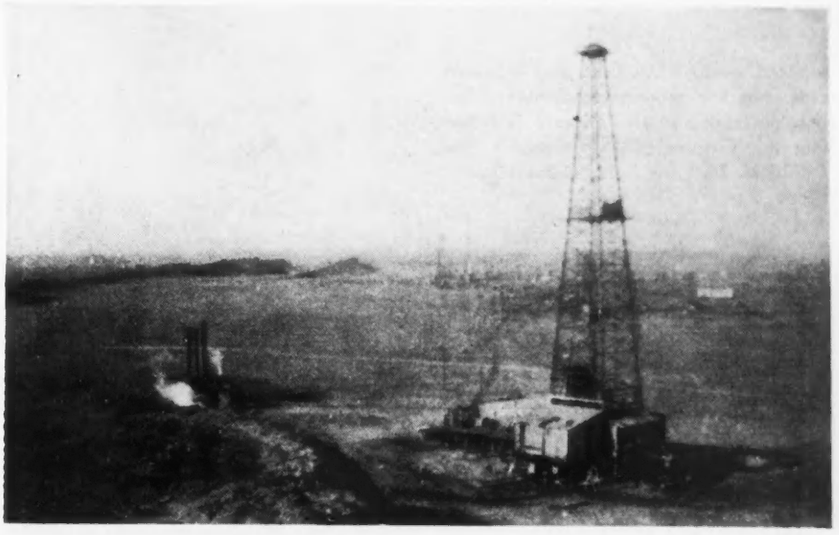


Drilling in Khaur, India, calls for modern rotary equipment, as shown at right.

Expect Greater Activity In Countries Abroad

Barring disturbances by war, both production and drilling in nations outside of the United States should reach new record levels

By WILLIAM V. GROSS, Foreign Editor

NO one can tell just what effect a general European war would have on drilling and production in the world outside of the United States. But if such possibilities are forgotten, and only the trends of consumptive demand and exploratory activity are considered, it is reasonably safe to predict an increase in footage and production during 1939 for these countries.

While the United States is fighting an oversupply of oil and curtailing its output drastically, other nations are making a serious effort to enlarge their domestic crude oil supply.

That they are succeeding to a considerable extent is shown by the trend of their production. Back in 1927, the year proration first became generally widespread in the United States, areas outside of this country produced but 28.6 percent or 361,097,500 barrels of the 1,262,582,000 barrels produced. Although production of the world by 1938 had increased to 1,975,640,000 barrels, 38.6 percent or 762,733,000 barrels were recovered outside of the United States.

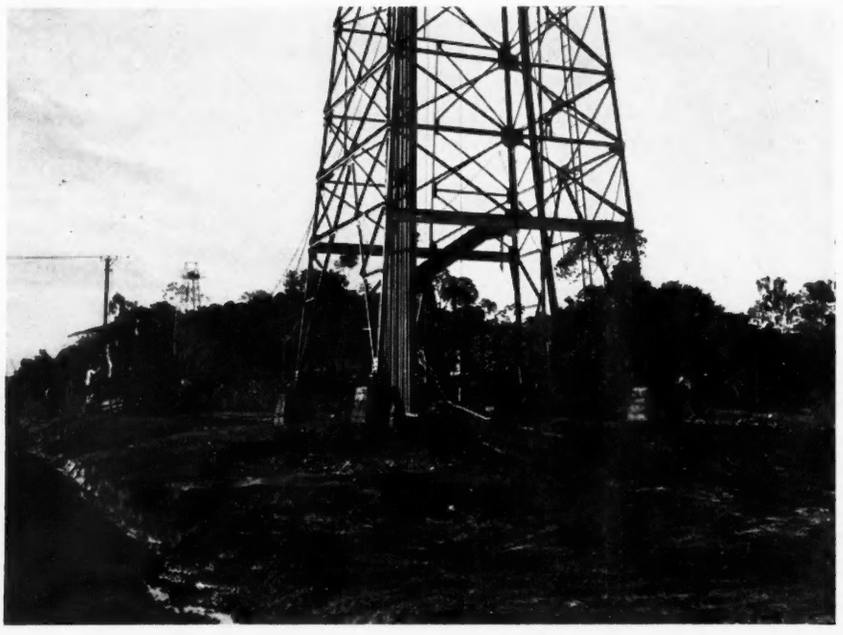
World production in 1938 was 3.3 percent below the all-time record of 2,042,007,000 barrels set in 1937, but countries outside of the United States produced practically the same amount, the United States having decreased considerably. During 1937, countries outside of the U. S. produced 762,847,000 barrels or 37.4 percent of the world's output.

Venezuela Activity Up

If market conditions continue as they are, Venezuela should complete about 40 wells per month during 1939 and her production should exceed slightly the 28,071,370 metric tons William Witman II gives as the official figure for 1938 output. About 60 rigs will be kept on routine and wildcat drilling. Exploratory work in 1938 netted encouraging results in both the eastern and western sectors of the country, but it is expected that the eastern portion will be more in the limelight for the next two or three years, due to new fields at Oficina and Jusepin, to say nothing of several others which are not anywhere near drilled up. Of course, the lake shore district of western Venezuela has a routine development program which will require years of steady drilling.

Colombia to Gain

Sharp increases in footage and production are in store for Colombia during the year. Predictions are 200 wells will be completed in 1939 in existing fields, 150 of them to come from La Cira and Infantas fields of the De Mares concession and 50 from the Barco concession. Current production of



Cleanout work in La Cira and Infantas fields calls for modern equipment. The work portrayed in this picture is being done on Tropical Oil Company's No. 496 in La Cira field, Colombia.

60,000 barrels daily probably will be doubled late in the year if completion of the trunk line from the Barco concession to tidewater on the Caribbean at Covenas allows Colombian Petroleum Company to open wells completed and closed in on the concession.

In addition to the above, the situation in Colombia today is such as to keep it definitely in the limelight of foreign activities for at least two years to come. Put Socony-Vacuum, The Texas Company, Shell, Standard of New Jersey and of California interests, to say nothing of other miscellaneous operators, all together as participants in one of the most active lease and concession flurries ever to hit South America and you have something that is bound to produce action. Speaking of conditions conducive to wildcat drilling, that prevailing in Colombia today is a "natural." There is, and will be for some time, considerable wildcatting in that country, so that if the law of averages functions there as in other virgin areas with geologic conditions favorable to the accumulation of oil, one may expect new reserves to be uncovered. If this happens in 1939, then the above estimate of 200 completions will have to be raised. The chances are it is a bit on the conservative side as it is.

O. C. Wheeler, chief geologist, International Petroleum Company, Toronto, states only 20 wells were completed on the Barco in 1938 with an initial aggregate of 58,000 barrels.

Trinidad to Produce More

Barring labor difficulties, Trinidad probably will produce more oil in 1939 than the 17,737,061 barrels produced in 1938 to show a gain of 14.4 percent over 1937 production. It is spending $1,500,000 for additional refining capacity. Due to deeper drilling trends on the West Indian island, Trinidad's footage in 1939 probably will exceed the 905,878 feet drilled in 1938. The 1938 footage figure was a slight decline from the total of the previous year, when 911,575 feet were drilled. Completions in Trinidad were slightly up, 253 wells having been completed in 1938 as against 249 in 1937. The colony opened the year with 35 rigs in operation, and several extensions recorded during the past year afford sufficient undrilled locations to keep these and additional rigs busy for at least two years or more.

In addition to exploitation drilling in old and new areas in Trinidad, considerable wildcatting is proposed for virgin areas during 1939. Heavy rigs bought recently for these tests presage deeper drilling for 1939. One of the tests is projected to below 10,000 feet. Fyzabad boasts of the depth record for the island thus far, a well there having been drilled to 9033 feet.

Argentina Questionable

Argentina's production in 1938 totaled 2,714,824 cubic meters, according to R. Horton Henry of Buenos Aires. This represented a decline of 4 percent for the private companies and an increase of 13 percent for Yacimientos Petroliferos Fiscales, the government's company. Private companies produced 1,284,225 cubic meters in 1938 and Y.P.F. 1,430,599. Production in 1939 is expected to exceed that of 1938.

Government policies and trends in Argentina are gradually throttling private enterprise in the oil industry, so the outlook is not good. But there will be considerable drilling by the government, which is listed as keeping 80 rigs and 25 core drilling outfits busy. Three new fields were listed in 1938, one in Mendoza and two in Salta.

Exploratory Work for Brazil

Four federal government rigs drilling now at Ponta Verde, Alagoas; Camassary, Bahia; Monte Alegre, Para; and in Serra de Moa, Territory of Acre will be kept busy by the Brazilian government during 1939. In addition the government is preparing to select new equipment from United States manufacturers to enable it to broaden the scope of current exploratory drilling. It would be foolish, those in charge of wildcatting believe, to condemn a country larger than the United States on the basis of only about 77 wildcats. Mark Malamphy, who has just returned from five years in Brazil as consulting geophysicist to the government, believes that petroleum does exist in Brazil and that important reserves eventually will be discovered. A talk with him and with Irnack C. do Amaral, engineer for Servico de Fomento da Produccao Mineral, leaves one with the impression that if Brazil does not get a new field in 1939 it will not be because 1939 failed to exceed in footage the figure established in 1938. Malamphy discusses Brazil elsewhere in this issue.

Bolivia and Brazil have entered into an agreement providing for joint contribution to a fund to be used to develop Bolivia's potential

crude reserves. In addition to exploratory drilling, Bolivia must do a certain amount of routine drilling to sustain production on properties taken from Standard Oil Company of Bolivia.

Peru May Decline

Oliver B. Hopkins told those attending the foreign production symposium of the American Institute of Mining and Metallurgical Engineers in New York in February that production for the country had dropped to 15,838,610 barrels in 1938, a decrease of 1,618,410 barrels from the amount produced in 1937. Peru listed 65 completions in 1938, including 54 oil wells and 2 gas wells.

Peru probably will not complete more wells in 1939 unless some of the several wildcat projects under way result in discovery of new fields.

Canada to Be Busy

With thousands of undrilled acres added to Turner Valley field, which is yet to be defined on three sides, Canada looks forward to a busy year in 1939. In addition, encouraging shows in wildcats and a new field in Lambton County, Ontario, indicate not all the drilling will be as deep and tedious as that of Turner Valley.

Turner Valley completions in 1938 totaled 40, as compared with 34 in 1937. Footage drilled in Canada during the year totaled 350,000, the greatest total of any year since the all-time peak of 370,597 feet drilled in 1929. Footage drilled in 1937 amounted to 291,954 feet. All Canadian provinces produced 6,871,515 barrels in 1938, as compared to 2,996,238 barrels in 1937. Roughly 97 percent of the dominion's oil comes from Turner Valley, but it is probable new discoveries will lower that percentage in 1939, even though the field itself may show some increase.

Expropriation Hurts Mexico

As things stand today the situation in Mexico does not look encouraging for drilling or production. It is hoped that something constructive may come of conferences between the government and Donald Richberg and Patrick Hurley, representatives of the expropriated companies. If the country returns to normal operation of the oil industry, considerable reconditioning and new drilling will have to be done before production is brought back to the 44,000,000 barrel annual yield rate which the country was maintaining before President Cardenas expropriated the oil industry.

Cuba Watched

Nelson B. Dickerman of Atlantic Refining Company says that late in 1938 his company started a test on a narrow anticline 3 kilometers south of Remedios on the north coastal plane of Santa Clara Province and that the company was doing seismograph and gravimeter work in Matanzas and Santa Clara provinces. The Shell interests also are rigging up on a deep test in Western Havana Province.

Cold Bay and Chinitna Bay wildcat efforts in Alaska are expected to continue in 1939. The former is a joint project of Standard Oil Company of California, Tide Water Associated Oil Company and Union Oil Company of California; the latter is a project of Iniskin Drilling Company of Los Angeles.

If the geological and geophysical work being carried out by Shell de Guatemalteca warrants such, Guatemala will get a test for oil this year. The company has large concessions, primarily in the Department of Izabal.

Russia to Drill Many

Russia's production in 1938 is estimated at 224,714,000 barrels by Basil Zavoico. This compares with 212,742,000 barrels produced in 1937. Footage drilled in 1938 was slightly under that drilled in 1937, he said.

It is felt, however, that Russia will do considerable drilling in 1939 because of failure to meet completion quotas in 1938 and vital need of increasing domestic production at a pace commensurate with the phenomenal gains being experienced in domestic consumption. In addition to drilling new wells, the country probably will recondition fully 2000 wells in 1939.

Roumania To Be Active

Barring war, Roumania will be the most active spot in Europe during 1939 from both production and drilling standpoints, though the decline in production, which has characterized operations there for several years, is expected to continue. The country drilled 961,040 feet in 1938, a decrease of 316,880 feet from the amount drilled in 1937. There are two things which might result in increased footage in 1939: the marked trend toward deeper exploratory drilling in Roumania and possibility of a practical reworking of the petroleum laws to induce and protect private capital. While the latter does not seem likely of complete realization during the first months of the year, it is true that King Carol, his law makers and the companies are working in that direction, with some results already.

Revised estimates put Rouma-

Seismograph party at work in the savannah country of Eastern Venezuela in late 1938.

nia's production for 1938 at 48,984,200 barrels, which may be compared with 53,239,500 barrels produced in 1937. Another decrease of at least 10 percent is predicted for 1939 if the situation there remains closely to what it is today. On the basis of 133 producers completed during the first 11 months of the year, Roumania is expected to put about 144 wells on production during 1938, which will compare with 207 in 1937 and 179 in 1936.

German Drilling Increasing

Germany drilled 190 kilometers of hole in 1938, which compares with 187 kilometers, or 613,516 feet, drilled in 1937. Professor Dr. W. Haack, state geologist for the Prussian Geological Institute, tells readers in an article elsewhere in this issue that the extensive drilling program sponsored by the Reich has resulted in discovery of 14 new fields, most of which are in the northwestern part of Germany. Its output, combined with that of annexed Austria, amounted to 642,000 metric tons in 1938, a figure which may be exceeded in 1939. Germany hung up a new depth record in 1938 when a test in Schleswig-Holstein drilled to 12,526 feet, a fact illustrative of the trend toward deeper drilling.

Drilling by subsidy will continue under the Nazi regime because lack of sufficient domestic production is a serious flaw in the German military program, and in this connection it is interesting to recall that two thirds of the above footage total represented wildcats.

Austria has only three producing oil fields, all small in relation to the American conception of oil fields, and it is not likely that more than 36 completions will be recorded there this year.

Hungary Improves

Hungary became increasingly self sufficient during 1938. Production has climbed to 1400 barrels a day as a result of 28 successful completions during 1938. This represents a third of Hungary's domestic requirements.

Brandon Grove with Socony-Vacuum at The Hague says a south extension to the Hodonin field of Czechoslovakia may call for some additional drilling in 1939, all which will be directed at developing shallow production above 500 feet. Czechoslovakia's production in 1938 was 42,000 barrels, which may be compared with 31,890 barrels in 1937.

Routine development in Poland probably will call for about 30 completions per month in 1939 if production is maintained at 1938 levels, which, incidentally were slightly higher than those of 1937. Most of the completions will be relatively shallow. Drilling will continue to be subsidized by the government on a limited scale.

England to Continue Search

England's exploratory campaign will continue throughout 1939, though probably less than a dozen tests will be drilled, unless a new field is found. Continued wildcatting gained encouragement from discovery during 1938 of semi-commercial production near Edinburgh, Scotland. Campbell M. Hunter, consulting engineer and geologist of London, states that as the year opened, about one fourth of all England, or 12,894 square miles, were under lease. Eighty-one licenses were involved. He says the continued search for oil in England appears warranted.

From a drilling standpoint, France's Pechelbronn field is about done; it is now regarded as primarily a mining proposition. But France

What happened at Maturin, eastern Venezuela, when a wildcat struck a shallow gas pocket. After the pocket burned out, work on the wildcat was resumed, but it was abandoned eventually as a dry hole.

will continue to drop some money on wildcatting in Morocco during 1939, although some officials high in the French oil business regard it as more or less of a futile gesture from an economic standpoint.

Denmark may get a taste of exploratory drilling before the 12 months are over. An American company obtained a concession late in 1938 giving it the right to explore for oil in all of Denmark. Whether geological work has gone far enough to allow selection of a drill site early in 1939 is not known, but due to Denmark's proximity to the Hanoverian Basin of Germany, it seems likely the country will get several tests before the concession is relinquished.

Italy has not completely dispaired of finding oil within that country, and a small scale wildcatting campaign continues. Results in her colonies have not been encouraging.

Egypt Interesting

One of the most interesting parts of the world to the oil business in 1939 will be the Near East.

Egypt's new field, Ras Gharib, completed five producers in the last half of 1938. They produced 73,494 tons, or 514,458 barrels, in the latter part of the year. Hurghada field, the established producing area of Egypt for years, dropped from 163,518 tons in 1937 to 146,063 tons in 1938. But with a highly competitive wildcat campaign in progress as the year closed, indications are that considerably more footage will be drilled in 1939.

Systemmatic development of concessions will continue in Albania in 1939, particularly because of the arrangement whereby Italy gets the lion's share of production from those concessions and because Italy wants crude reserves today more than ever. The little country probably will complete in excess of 100 wells this year, most of them shallow. Wildcatting will have to be continued, or not only concessions but cash guarantees as well will be forfeited.

Arabia Has Program

Development of 35-gravity oil in Saudi Arabia during the year by California Arabian Standard Oil Company calls for a 1939 program to develop that 4700-foot pay. In addition to other contemplated drilling, plans to deepen 10 shallow holes have already been announced.

A 2000-barrel well in Kuwait and assurance of production in another wildcat means Kuwait Oil Company will do additional drilling there this year. Discovery of a fourth pay on Bahrein Island at around 4500 feet has caused Bahrein Petroleum Company to assign three rigs for its development. Two others will be kept busy on the regular pay.

Iran and Iraq

Iran's production from Masjid-i-Sulaiman and Haft Kel fields totaled 77,230,000 barrels in 1938, a slight increase over the 76,590,000 barrels produced in 1937, according to Anglo-Iranian Oil Company. It is likely that drilling in 1939 will surpass that of 1938 because of additional acreage opened for development: Eocene oil at Haft Kel, a new structure in the White Oil Springs area, and lack of definition of Gach Saran field, and gas production at Pazanum.

British Oil Development will continue drilling on Quaiyarah structure in northern Iraq during 1939. About 65 wells have shown for production, but a pipe line outlet for the field is lacking. If the shortest route from the field to Iraq Pipe Line Company's line to Mediterranean tidewater is selected, the new line, which probably will be built in 1939, will be 45 miles long. If, as has been rumored, it is decided to parallel the old line, then another major pipe line project is in the offing. The combined length of the two branches of Iraq Pipe Line Company's old line is about 1500 miles.

India is at or close to an all-time peak in production, production having passed the annual rate of 350,322,222 gallons, the rise in output being attributed to Singu, Attock, Thayetmo and Digboi fields. The outlook for 1939 hinges on success of current development of Dhulian field, Punjab, which has been labeled as having greater possibilities than Khaur. The play is for a 7500-foot sand. Deeper drilling in Burma is showing a few encouraging results.

East Indies Lively

East Indies will afford lively drilling spots for years to come. It is true that production in some of the older fields, such as Tarakan and Samarinda of Borneo, as well as those of North Sumatra, has declined for some time, but South Sumatra, Java and Ceram have had phenomenal increases in the past few years.

There are no small companies among the producers in the East Indies. Many of the exploratory concessions do not expire until after 1970 and these cover millions of acres. Preliminary geology, core-hole drilling and seismograph work are in evidence on a number of them.

New Guinea probably will see considerably more drilling in 1939 than it did in 1938 in the process of narrowing down several structures found during 1937 and 1938. Three strings of tools were kept busy there in 1938 doing exploratory drilling on concessions of a Dutch - American combine, and it is understood oil has been found. This combine budgeted £8,000,000 for exploratory work in New Guinea in 1938.

Other Areas

This brings us down to a discussion of what might be termed miscellaneous countries, so far as their present ratings as producers are concerned. Japan probably should head the list, due to prominence in headlines today. This country early in 1938 earmarked 20,000,000 yen to be spent for wildcatting 1938, 1939 and 1940. The 1938 program called for prospecting 164 localities, most of them regarded as shallow prospects. But during the year Japan got a taste of deep drilling, completing a distillate well at 11,515 feet. The sand uncovered will be developed during 1939 and a deeper one will be sought in the same field, Kinsui.

Continued drilling in Australia is assured by government appropriations, both state and federal, for the express purpose of subsidizing in part efforts to establish commercial production. In addition, Freney-Kimberley Oil Company, Oil Search, Ltd. and Drillers, Ltd., have not completed exploratory drilling on holdings they consider to have possibilities of producing. However, due to the fact that all drilling in Australia is wildcat drilling, it is not likely that it will record more than 10 completions during the year. The chances are, however, that these will be deeper on the average than past tests, heavier equipment having been purchased. The deepest test on that continent, by the way, is only 3246 feet deep, with the average abandonment considerably shallower than 2000 feet, so that one might say Australia has only begun to look for oil.

New Zealand right now is getting the first serious wildcatting it has ever had. Drilling started late in 1938 in the Poverty Bay district of the North Island, near Gisborne. So far the British colony has a small amount of shallow production at Taranaki, where deeper testing is being carried out.

Turkey's wildcatting will continue. Test drilling there during 1938 justified deeper drilling in the 1939 program, which probably will not include more than 10 wells.

Consumption and Reserves United States Are

World demand for petroleum during 1938 decreased but 7,000,000 barrels, as large gains in countries abroad offset loss of 35,000,000 barrels in U. S.

By L. J. LOGAN,

MUCH interest was exhibited in the several economic papers of world-scope presented at New York February 14 and 16 before the petroleum division of the American Institute of Mining and Metallurgical Engineers.

Three papers fell within this classification.

Information was given on world consumption of petroleum and related fuels in 1938 in a paper by V. R. Garfias, R. V. Whetsel, and J. W. Ristori, of the Cities Service Company, New York. Those authors showed that the world demand for oil was only 7,000,000 barrels less in 1938 than in the previous year, and that the decline resulted from a 35,000,000 decrease in the United States, consumption having continued to increase in the rest of the world, considered in the aggregate. As in 1937, one important reason for relatively large petroleum demand abroad was the heavy military consumption.

Although much has been published on petroleum reserves of the United States, similar information on many of the other oil producing countries is limited and incomplete. Nevertheless, a survey of world petroleum reserves was attempted in a paper by V. R. Garfias and R. V. Whetsel, of the Cities Service Company, New York, who estimated the world total at 30,900,000,000 barrels. Of that total the countries outside the United States account for 55 percent and the United States 45 percent. U. S. S. R. (Russia) ranks second to the United States, having about 16 percent of the world reserves; and other countries with reserves of over a billion barrels include, in the order of their importance, Iran, Venezuela, the Dutch East Indies, and Iraq. The authors made it clear, however, that more complete and more accurate information on world petroleum reserves would be highly desirable.

Some valuable information on the economic aspects of oil field development in Colombia was given in a paper by E. Ospina Racines, first vice consul of Colombia in charge of petroleum affairs in New York. The author asserted that Colombia was one of the most promising countries in South America for future petroleum development, in view of the important reserves and the comparatively attractive legal and economic conditions there. The various economic factors, such as distance of an oil field from seaboard, are taken into consideration in the petroleum laws, income tax laws, and rules and regulations, with the view toward encouraging rather than discouraging petroleum development.

World Production of Crude Oil and Related Fuels
(Thousands of Barrels)

	1937			1938		
	Crude Oil	Related Fuels	Total	Crude Oil	Related Fuels	Total
United States	1,279,160	51,967	1,331,127	1,212,970	52,000	1,264,970
Russia	200,000	1,000	201,000	209,000	1,000	210,000
Venezuela	185,700	900	186,600	189,100	900	190,000
Iran	78,740	1,000	79,740	75,000	1,000	76,000
Netherlands East Indies	56,270	1,900	58,170	55,600	2,000	57,600
Roumania	52,180	800	52,980	48,500	700	49,200
Mexico	46,900	900	47,800	37,000	1,000	38,000
Iraq	30,600	.....	30,600	30,900	.....	30,900
Colombia	20,290	600	20,890	21,500	600	22,100
Trinidad	15,500	120	15,620	17,800	200	18,000
Germany	3,180	12,140	15,320	4,300	13,000	17,300
Peru	17,470	1,300	18,770	16,000	1,200	17,200
Argentina	16,240	400	16,640	16,300	400	16,700
British India	9,850	140	9,990	9,860	140	10,000
Bahrein Islands	7,760	.....	7,760	8,480	.....	8,480
Canada	1,180	1,800	2,980	5,000	3,000	8,000
British Borneo	6,030	130	6,160	7,180	150	7,330
Poland	3,710	150	3,860	3,820	150	3,970
Japan	2,490	150	2,640	2,530	150	2,680
Ecuador	2,160	.....	2,160	2,260	.....	2,260
Egypt	1,150	50	1,200	1,540	60	1,600
Others	1,830	7,500	9,330	2,100	7,700	9,800
	2,038,390	82,947	2,121,337	1,976,740	85,350	2,062,090

World Consumption of Petroleum and Related Fuels During 1938

By V. R. GARFIAS, R. V. WHETSEL and J. W. RISTORI
Cities Service Company

World consumption of petroleum and related fuels in 1938 totaled approximately 1,908,000,000 barrels, or about 7,000,000 barrels less than in 1937. These figures are exclusive of military consumption in foreign countries, which are not available.

However, foreign military consumption is approximately the difference between total production

# of Nations Outside of the Increasing Rapidly

Interest aroused by world-scope economic papers presented before petroleum division of American Institute of Mining and Metallurgical Engineers

Associate Editor

of petroleum and related fuels and the "partial total" consumption as given above, after adding any decrease or subtracting any increase in stocks in the United States.

Due to the wars in China and Spain and war preparations in Central Europe, foreign military consumption and possible additions to foreign stocks increased about 70-,000,000 barrels in 1937 over 1936 and remained at this high level in 1938.

This high military consumption and a decline of 35,000,000 barrels in consumption in the United States were the outstanding developments in 1938.

A table presented with the paper showed that world production of crude oil and related fuels totaled 2,062,090,000 barrels in 1938, compared with 2,121,337,000 barrels in 1937 and 1,864,997,000 barrels in 1936; and that consumption of petroleum and related fuels amounted to 1,907,507,000 barrels in 1938, compared with 1,914,856,000 barrels in 1937 and 1,795,560,000 barrels in 1936. The same table showed that the world total excess of production over consumption in 1938 was 154,583,000 barrels, including 130,770,000 barrels in the United States and 23,813,000 barrels outside the United States; in 1937 the world total excess of production over consumption had been 206,481,000 barrels, including 161,445,000 barrels in the United States and 45,036,000 barrels outside the United States; while in 1936 the total was 69,437,000 barrels, including 52,209,000 barrels in the United States and 17,228,000 barrels outside the United States.

In the United States the excess

World Consumption of Petroleum and Related Fuels

(Thousands of Barrels)

COUNTRY	1938						
	Motor Fuel	Kerosene	Gas and Fuel Oil	Lubricants	Miscellaneous	1938 Total	1937 Total
United States	521,000	56,000	407,000	21,200	129,000	1,134,200	1,169,682
Russia	27,000	42,000	65,000	9,500	21,000	164,500	158,200
United Kingdom	47,500	7,000	30,000	3,800	4,500	92,800	85,900
France	26,500	1,800	18,300	2,500	4,900	54,000	50,900
Germany	27,300	1,500	15,500	3,500	5,200	53,000	45,300
Canada	23,000	650	15,500	4,000	4,850	48,000	43,500
Argentina	7,000	1,300	17,000	400	1,800	27,500	25,300
Japan	7,800	1,500	11,800	1,800	2,100	25,000	34,100
Netherlands—West Indies	250	50	17,000	50	5,000	22,350	18,050
Italy	5,500	950	11,850	950	1,750	21,000	20,000
Mexico	3,000	800	12,600	200	1,400	18,000	21,590
British India	2,700	7,000	4,100	1,050	1,400	16,250	16,150
Australia	7,800	1,300	3,800	450	1,100	14,450	13,850
Roumania	1,000	1,200	10,000	220	1,800	14,220	12,620
Netherlands—East Indies	1,500	2,000	6,100	250	1,500	11,350	11,300
Netherlands	3,600	2,000	3,800	450	1,100	10,950	10,400
Iran	600	1,300	5,700	400	2,600	10,600	10,150
Sweden	4,100	900	3,000	400	700	9,100	8,900
Venezuela	700	30	1,350	40	6,100	8,220	8,120
Brazil	2,750	850	4,250	250	100	8,200	8,100
Union of South Africa	4,100	470	1,700	280	400	6,950	6,740
Belgium	4,150	350	1,300	400	500	6,700	6,650
Denmark	2,700	800	2,500	350	200	6,550	6,050
China	1,300	2,800	1,700	300	400	6,500	6,600
Egypt	800	1,800	2,800	200	450	6,050	5,730
French West Africa	340	100	4,900	40	10	5,390	5,365
Cuba	750	80	4,200	50	120	5,200	4,750
Chile	700	100	4,100	70	50	5,020	4,870
Norway	1,500	500	2,500	150	200	4,850	4,800
Trinidad	120	70	4,150	30	350	4,720	4,520
British Malay	1,000	300	2,900	120	200	4,520	4,420
New Zealand	2,550	200	1,300	100	200	4,350	4,200
Philippine Islands	1,000	600	2,500	90	130	4,320	4,220
Hawaiian Islands	1,200	200	2,400	100	100	4,000	3,470
Spain	2,300	180	1,300	100	120	4,000	5,100
Iraq	350	230	2,400	60	800	3,840	3,740
Switzerland	1,750	170	1,300	150	100	3,470	3,270
Poland	800	1,100	600	350	500	3,350	2,800
Panama Canal Zone	130	30	2,770	30	40	3,000	2,670
Ceylon	355	235	2,370	30	10	3,000	2,889
Colombia	800	130	1,900	20	125	2,975	2,450
Peru	500	200	1,700	30	300	2,730	2,910
Greece	550	150	1,600	60	130	2,490	2,380
Uruguay	450	250	1,700	40	40	2,480	2,430
Irish Free State	1,200	550	280	70	250	2,350	2,260
Czechoslovakia	1,200	400	390	200	30	2,220	3,330
Finland	1,050	550	130	120	120	1,970	1,890
Hungary	600	480	650	110	120	1,960	1,930
Algeria	950	300	450	80	120	1,900	1,850
Puerto Rico	540	80	1,100	35	45	1,800	1,720
Palestine	380	440	650	30	200	1,700	1,535
Jamaica	210	55	1,310	10	35	1,620	1,590
Portugal	620	410	360	70	70	1,530	1,500
French Morocco	830	90	150	40	140	1,250	1,240
Hongkong	240	60	790	100	10	1,200	1,075
Turkey	340	320	440	60	17	1,177	1,150
Kenya and Uganda	375	145	545	25	10	1,100	1,095
Siam	190	360	340	60	60	1,010	930
Austria							2,720
Miscellaneous	5,337	3,040	4,626	657	915	14,575	13,905
	764,857	148,455	732,451	56,227	205,517	1,907,507	1,914,856

Consumption figures include crude consumed as such, all its products and related fuels such as Benzol, Natural Gasoline, Alcohol used as Motor Fuel. Oil delivered to ships bunkers is included in consumption of country where deliveries made.

of exports over imports was 139,000,000 barrels in 1938, compared with 115,677,000 barrels in 1937 and 74,890,000 barrels in 1936; while 8,230,000 barrels were taken from storage in 1938, in contrast with an addition to storage of 45,768,000 barrels in 1937 and a withdrawal of 22,685,000 barrels in 1936.

These figures in this table indicated that military consumption and storage outside the United States totaled approximately 162,813,000 barrels in 1938, compared with 160,713,000 barrels in 1937 and 92,122,000 barrels in 1936.

Estimate of World Oil Reserves

By V. R. GARFIAS and R. V. WHETSEL,
Cities Service Company, New York

World oil reserves at the end of 1938 aggregated 30,900,000,000 barrels; and up to that time, cumulative world production had totaled 33,263,000,000 barrels.

Of the world reserves, 14,000,000,000 barrels, or 45 percent are in the United States.

Russia ranks second among the countries of the world in present reserves, holding 5,000,000,000 barrels, or 16 percent of the world total.

Iran is third, with 3,500,000,000 barrels, or 11 percent of the world reserves; Venezuela ranks fourth, with 2,500,000,000 barrels, or 8 percent of the world reserves.

The Netherlands East Indies rate fifth, having reserves of 1,600,000,000 barrels, or about 5 percent of the world total; and closely following is Iraq, with 1,500,000,000 barrels, also about 5 percent of the world total.

Among the major producing countries, the United States is the only one in which the reserves or future production is less than past production.

Only three countries outside the United States have produced more than 1,000,000,000 barrels.

The states of Texas, California, and Oklahoma have each produced more than Russia, the second ranking producing country.

As world consumption of petroleum aggregated about 2,000,000,000 barrels in 1938, it is indicated that the present reserves are equivalent to the requirements for approximately 15 years, at the current rates of consumption.

The reserves as listed above and in an accompanying table are not classified or differentiated as to type. They include such heterogeneous items as the largely proven profitable reserves of the United States, the present largely proven unprofitable reserves of Mexico, and the reserves of Russia, which cannot yet be classified.

Obviously, these estimates of reserves of different countries are not made on a comparable basis, and the justification for this study lies more in calling this situation to the attention of the industry than in the comparable usefulness of the figures themselves.

World Oil Reserves
(In Millions of Barrels)

COUNTRY	*Reserves on January 1, 1939	Production to January 1, 1939
United States:		
Texas	7,500	5,650
California	2,800	5,162
Oklahoma	900	4,440
Louisiana	600	864
Kansas	600	958
New Mexico	550	197
Illinois	280	455
Wyoming	280	454
Pennsylvania and New York	200	1,071
Arkansas	120	460
Others	170	1,473
Total U. S.	14,000	21,184
Russia (U. S. S. R.)	5,000	4,025
Iran	3,500	878
Venezuela	2,500	1,693
Dutch East Indies	1,600	838
Iraq	1,500	137
Roumania	700	835
Mexico	600	1,895
Colombia	400	230
Argentina	200	187
Peru	200	240
Trinidad	150	164
Others	550	957
World Total	30,900	33,263

* No attempt is made to classify reserves into proven, profitable, or unprofitable.

Economic Aspects of Oil Field Exploitation in Colombia

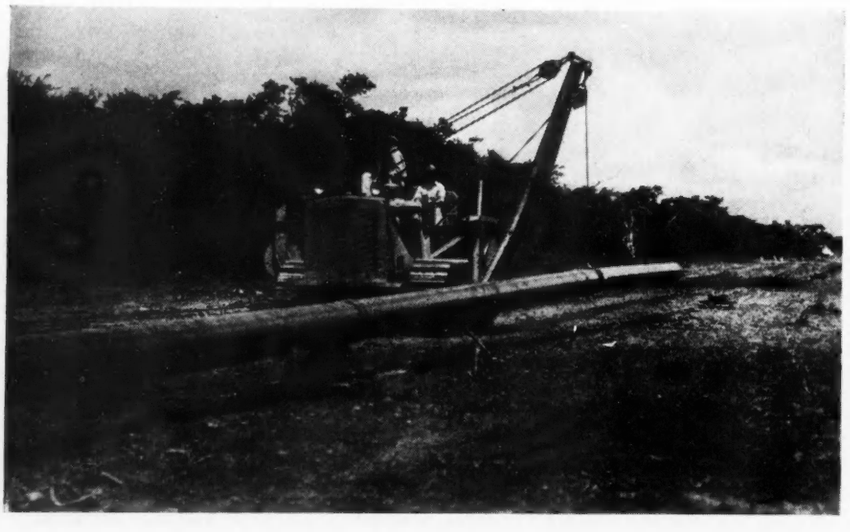
By E. OSPINA RACINES,
First vice consul of Colombia in charge of petroleum affairs in New York

Colombia is one of the most promising countries in South America for future petroleum development, and its importance may be expected to increase if and when the United States becomes the world's foremost importer of petroleum.

Colombia is primarily an oil producing country, as opposed to those of two other main groups, the consuming countries and those of balanced production and consumption. Colombia consumes only 12 percent of its production, having produced 20,298,000 barrels in 1937, compared with consumption of 2,453,000 barrels. Thus the country is relatively important in international petroleum trade, although it produced its first million barrels as late as 1926.

In 1937 the total international trade demand for petroleum was 469,132,000 barrels, which represented consumption of the various countries minus their own production. Of the quantity available for export, Colombia furnished 3.7 percent, although its production was only 1 percent of the world total.

Prospective oil lands of Colombia lie chiefly in the drainage areas



Laying Standard Oil Company of Venezuela's line from Caripito to La Guiria.

Drill stem for seismograph shot hole in the jungles and savannah of Colombia often have to be transported on the backs of mules. These at right are getting ready to go out on location in the Magdalena Valley for Shell of Colombia.

of the principal rivers. In the order of their importance, those regions are: (1) the Magdalena River basin, containing the only production at present; (2) the Catatumbo River basin, which is under active development and which promises to become an important producing region; (3) the Llanos or great eastern plains extending from the foot of the eastern cordillera toward the Orinoco River, an area of much promise; (4) the Caribbean coastal plains, where there are possibilities, despite some unsuccessful exploratory drilling 18 years ago; and (5) the southern Pacific coastal region, which appears to be a continuation of the oil zones of Peru and Ecuador.

The location and distance from seaboard of an oil field in the interior of Colombia is a direct economic factor in the capital investment required, pipe line investment, transport tariff, pipe line tax on common carriers, and in the royalty payable to the government. Inasmuch as these various economic factors largely affect the exploitation of petroleum, they are taken into proper consideration in the country's petroleum laws, the income tax laws, and other rules and regulations; and the taxes, royalties, transportation tariffs, loading charges, and so forth are fixed accordingly by the government.

Flexible factors which may affect the net return per barrel are the tax payments, the credits obtained from refining operations, and the cost of production. Consequently, the economic importance of credit operations and low production costs is apparent.

A study of the taxes, tariffs, and other factors affecting a producing area 540 kilometers inland was offered for illustration, and the author pointed out that an increase in the price of oil of 10 cents a barrel at the port would permit the exploitation of a field some 136 miles or 220 kilometers farther in the interior, for the same return per barrel. This consideration is of particular significance for oil lands located on an economic boundary.

Levelling off ground for storage tanks at Covenas, tide water terminal of the line leading from the Barco concession in Colombia.

Oil Field Developments Abroad Are Active

Steady demand for petroleum promotes exploration for new fields and drilling of established fields in 1938, and production of crude is well maintained

By L. J. LOGAN, Associate Editor

CRUDE oil production was generally well maintained in 1938 in the countries outside of the United States, aggregate output of those countries having been about the same as in 1937.

Some of the countries showed decreases, but those declines were compensated by the increases recorded in other countries.

Throughout the world, oil consumption is tending to increase steadily, and for meeting that growing demand, exploration and exploitation developments are being carried on actively in many countries.

A comprehensive view of field activity in all parts of the world was presented in the group of papers on foreign field developments at the annual meeting of the American Institute of Mining and Metallurgical Engineers at New York February 15.

A world-wide survey of field activity, based on papers presented at the annual meeting of the American Institute of Mining and Metallurgical Engineers at New York February 15, 1939.

Abstracts of those papers are herewith published by countries:

Canada

Important wildcats being drilled in several districts of country

By G. S. HUME, Geological Survey of Canada

Turner Valley, on the eastern edge of the foothills of Alberta, 35 miles southwest of Calgary, remains the major oil field in Canada, production having totaled 6,691,075 barrels in 1938, or considerably more than double the output of 2,767,221 barrels in 1937.

All Canadian production in 1938 totaled approximately 6,946,479 barrels, compared with 2,995,025 barrels in 1937 and 1,498,006 barrels in 1936. The 6,946,479 barrels produced in 1938 included 6,742,039 barrels in Alberta (mostly at Turner Valley), 171,359 barrels in Ontario, 23,081 barrels in New Brunswick, and 10,000 barrels (estimated) in the Northwest Territories.

Aside from the 6,691,075 barrels produced at Turner Valley, the Alberta production of 1938 included 14,458 barrels at Red Coulee field, 18,344 barrels at Wainwright-Ribstone field, 15,098 barrels at Taber, and 3,064 barrels at Moose Dome.

Natural gas production in Canada in 1938 totaled 33,159,466,000 cubic feet, compared with 27,918,530,000 cubic feet in 1937. The 1938 total included 21,792,779,000 cubic feet in Alberta, 87,422,000 feet in Saskatchewan, 600,000 feet in Manitoba, 10,696,833,000 feet in Ontario, and 581,832,000 feet in New Brunswick.

Although Turner Valley prior to 1936 produced only gas and naphtha from the Mississippian (Madison) limestone that had been found in 1924, it subsequently has yielded crude oil from the same horizon but lower on the west flank of the structure, which is a large fold cut off on the east side by an overthrust fault of great displacement.

At the end of 1938 there were 65 crude oil wells in the field with potential output of 50,000 to 60,000 barrels daily but with restricted output according to the market demand of the Prairie provinces. These crude oil wells are in addition to 104 gas wells. In the harvest season of 1938 allowable production at Turner Valley was increased to 28,363 barrels a day, but arrival of winter cut the demand to 11,500 barrels daily.

In 1938 drilling at Turner Valley comprised the completion of 36 crude oil wells and 1 dry hole. The deepest well on the west flank reached 10,209 feet, found oil in the upper zone of the Madison limestone but salt water in the lower zone, thereby defining the west edge of the field.

There are two productive areas at Turner Valley. The larger, in

the south end of the field, is 5 miles long and 2 miles wide. The other, 10 miles to the north, is not so well defined but has several producing wells over a length of 2½ miles. The intervening area is all structurally favorable for oil, although at one place a dry hole has been drilled, indicating that at least a small part of it will be unproductive. Beyond the most northwesterly well in the north area the structure extends several miles northwest, and it is not yet known how much of that area will be productive.

Small production is found in the Foothills outside of Turner Valley, 35 miles west of Calgary, in the Devonian limestone of Moose Mountain. The structure is a large anticlinal fold and may become an important field if porous reservoir rocks are encountered at greater depths.

Another foothills test of the Devonian limestone is being drilled on Clearwater River, 80 miles northwest of Calgary. Porous limestone saturated with oil and gas was encountered at less than 1300 feet. This structure also is an anticlinal fold, being several miles long and one to two miles wide.

Interesting wildcats now being drilled include one on the Watson structure, 55 miles south of Turner Valley; in the Brazeau area of the Foothills, north of the Clearwater area (at 4500 feet); on Ram River, south of Brazeau and north of Clearwater; and on Savannah Creek, about 30 miles south and west of the south end of Turner Valley. Complicated structural conditions but no production so far have been found on the Watson structure, on the Birch Ridge uplift northwest of Turner Valley, and on the Bearberry anticline 60 miles northwest of Calgary.

Only a few wells, in widely separated areas, were drilling on the Plains in 1938. Tests included one in the Peace River district of Alberta, near the site of a small gas well completed in 1923; a well drilled south of the Ribstone area of east central Alberta where two wells each yield about 20 barrels of heavy oil daily; and a test east of the latter area at Vera, 28 miles east of the Saskatchewan-Alberta boundary, which encountered oil of 10.9 A.P.I. gravity.

Further drilling in Saskatchewan in 1939 is anticipated, because of the need for more gas to supply the city of Saskatoon.

Small production was developed in Ontario in 1938 near Watford in Lambton County, east of Sarnia, where 15 wells yielded oil from Devonian limestone at 365 to 480 feet. The largest of the wells had an initial production of about 100 barrels daily. The field has not been fully outlined, although some dry holes have been drilled, and at present it is over 2 miles long and 1 mile or more wide.

Colombia

Oil companies actively carry on prospecting and development work

By O. C. WHEELER, Chief Geologist,
International Petroleum Co., Ltd., Toronto, Canada

Prospecting and development in Colombia in 1938 were greater than ever before, the year having brought record drilling of wells, development of potential production, geological and geophysical work, leasing, and acquisition of concessions. Companies that participated in the activity included The Texas Company, Socony-Vacuum Oil Company, Richmond Oil Company (Standard of California), Shell, and Tropical.

Noteworthy was the work on the Barco Concession, in eastern Colombia, adjacent to the Venezuelan frontier and constituting a part of the Maracaibo Basin. Camp and other facilities were constructed, and 20 wells were completed, with initial production of about 58,000 barrels daily, although they awaited outlet through a 260-mile, 12-inch pipe line to the Port of Covenas, construction of which is under way.

Although leasing was confined previously largely to the Magdalena Valley and Coastal area, it was extended in 1938 also into the more inaccessible llanos of eastern Colombia. The seismograph and gravity meter were used extensively in the Magdalena Valley and to some extent in eastern Colombia.

Colombian Petroleum Company, through drilling of 22 wells on the Barco Concession in 1938, extended the Petrolea and Rio de Oro fields and tested several other areas, having drilled a 3045-foot dry hole on the Leoncito faulted anticline and having started a test on the Carbonera fault zone. Seventeen productive wells and a dry hole were completed at Petrolea and 3 oil wells at Rio de Oro field.

Socony-Vacuum Oil Company on concessions north of the Tropical property and between the Rio Sogamoso and Rio Lebrija was drilling at 6500 feet at the end of the year on a deep test, Narino No. 1.

Tropical Oil Company in 1938 completed 111 wells on the De Mares Concession, all but one of which were producers. Production from the Infantas and La Cira fields totaled 21,581,588 barrels.

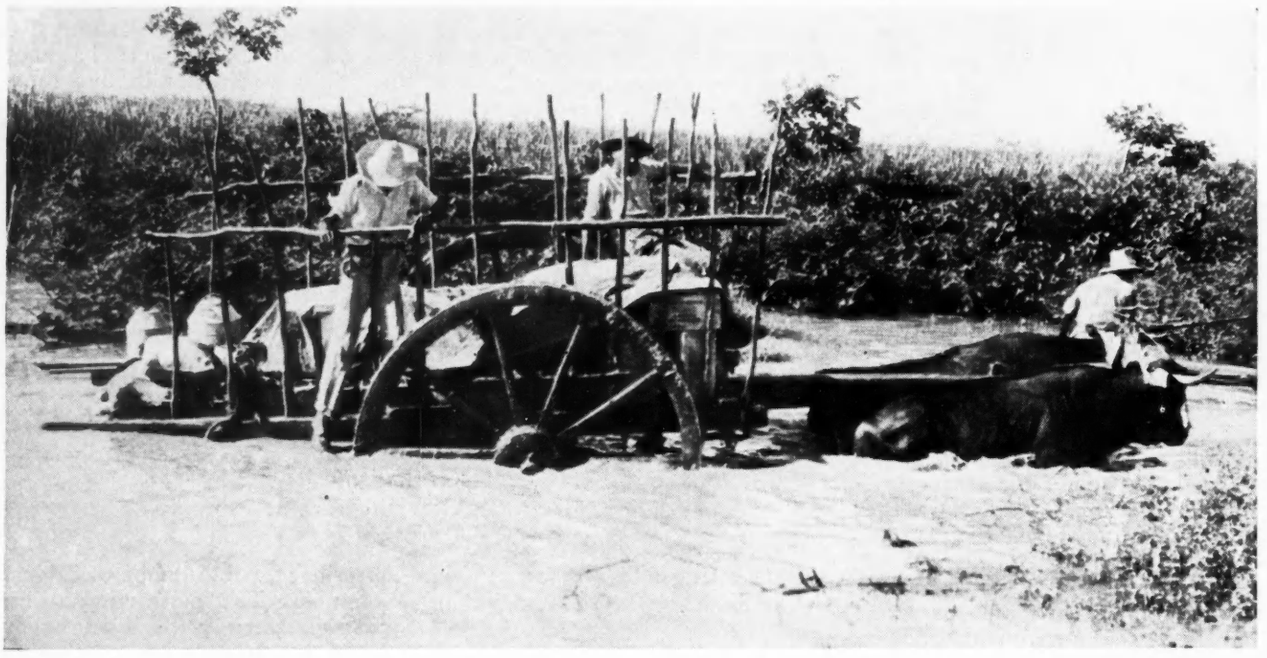
Cuba

Bacuranao field declines rapidly; drilling of two deep tests begun

By ROY E. DICKERSON, Atlantic Refining Company

In the absence of drilling of new wells, the Bacuranao serpentine field showed in 1938 a rapid decline of production. The field averaged about 20 barrels a day for the year, but was down to 15 barrels daily in December.

The Motembo area yielded



Transporting seismographic equipment used by Atlantic Refining Company exploratory crews in studying Cuba's potential oil resources. Atlantic's crews have studied more than 15,000,000 acres on the Island. A deep-test exploratory well, expected to penetrate a minimum depth of 4500 feet, is now being drilled near Remedios, Santa Clara Province.

around 160 barrels daily for the year.

Late in 1938, Atlantic Refining Company of Cuba started a deep test on a long, narrow anticline 3 kilometers south of Remedios, on the north coastal plain of Santa Clara Province. The company also was doing extensive seismograph and gravity meter work in Matanzas and Santa Clara provinces.

The Shell Company was rigging up a deep test in western Havana Province, 2 kilometers west of San Antonio de los Banos.

England

Active exploration is continued; gas found in well near Edinburgh

By A. H. TAITT
Through Courtesy of D'Arcy Exploration Company, Limited

Exploratory drilling was continued in 1938 by D'Arcy Exploration Company, Limited, subsidiary of Anglo-Iranian Oil Company, Limited. During the year two additional wells were drilled in the South, bringing the total completed in that area to 5 wells. Tests were commenced in the Midlands, East Yorkshire, and Scotland, where one natural gas well was completed during the year.

A test at Kingsclere, in Hampshire, southern England, was abandoned in the Trias at 5125 feet. A shallow test near Pevensey in Sussex encountered showings of oil in the Wealden series but it was abandoned at 842 feet in the Kimeridge clay, underlying the Portland beds. A geological test is being drilled north of Lulworth in Dorset, where the outcropping Wealden series, Lower Cretaceous is impregnated with oil.

A location has been made for a test of a structure near Ollerton in Nottinghamshire, eastern England. A test on the Eskdale pericline near Whitby in Yorkshire was abandoned at 2486 feet in the Trias; and a second well, 100 feet from the first, encountered the top of the upper limestone of the Permian at 4196 feet and was drilling at 4204 feet at the end of the year.

At Gun Hill in North Staffordshire, Midlands, a test entered at 1535 feet the lower Carboniferous limestone, which yielded oil at Hardstoft in Derbyshire in 1919. At Gun Hill, however, the limestone was unproductive, although oil showings were found immediately above that limestone in shales and thin limestones, and drilling was proceeding at 3861 feet at the end of the year, with the object of obtaining additional geological information. The Hardstoft well, which was pumping 1 ton of oil weekly, was deepened from 3127 to 3272 feet and acid treated. Several shallow tests revealed that oil seepages at Coalport, Coalbrookdale in Shropshire, originated in thin and only locally developed Coal Measures of the upper Carboniferous.

On the D'Arcy-Cousland anticline near Edinburgh, Scotland, a test of the oil shale group of the lower Carboniferous was completed at 2917 feet. The test encountered several promising sands and a drill stem test showed natural gas production of over 10,000,000 cubic feet per day and a small yield of oil. A second test, 200 feet lower on the structure, had reached 616 feet at the end of the year. A third well, 2 miles north of the first, and on the north end of the structure, will commence early in 1939. Several core tests have been drilled in

Fifeshire for structural information on which to base a decision whether or not to drill to the similar objective as that at Cousland.

In addition to the development by the D'Arcy company, geological and geophysical work and some drilling were carried out by three other companies in England and Scotland in 1938.

Anglo-American Oil Company completed a test on the south dome of the D'Arcy-Cousland anticline in Scotland. After penetrating the lower Carboniferous and penetrating part of the upper Devonian section, to a total depth of 3857 feet, the operators plugged the well back to 1760 feet and completed it as a 10 barrel oil well producing from 40 feet of sand in the oil shale group of lower Carboniferous age. At the end of 1938 a second well was drilling in the oil shale formation at 1675 feet.

Having failed to find important oil or gas showings, Gulf Oil Company abandoned its test at Penshurst in Kent at 5600 feet. The well went through the normal series of Jurassic, Liassic, and Rhaetic beds and then entered the lower Carboniferous.

Steel Brothers abandoned a well on the northern end of the Derbyshire dome near Edale, which had been started in 1937, having ceased drilling at 757 feet in Carboniferous limestone, which contained water.

U. S. S. R. (Russia)

Difficulty in maintaining production in 1939 likely, despite gain in 1938

By BASIL B. ZAVOICO, Geologist
The Chase National Bank, New York

It is believed that during the coming year the Soviet Government will be barely able to maintain the production of oil at levels reached in 1938 and that the declines in Baku and Grozny areas will not be fully compensated by increased production elsewhere.

Production of gasoline, however, should show an appreciable increase because of the improvement in cracking practices and also because of the completion of several plants whose construction was delayed during the past few years.

Provided the internal situation in the country reaches some equilibrium about two years of concentrated effort will be required before another large advance in crude oil production and refining can be realized to catch up with the rapidly growing domestic requirements. As long as the government forces its new fields at peak loads, causing waste in reserves, no true improvement in the industry can be achieved, and some measure of proration to prevent physical waste and to assure a steady rate of output is an immediate economic necessity.

In 1938 the Russian oil industry increased its production 4.69 percent, but it has not been able to correct basic difficulties. The "sabotage" and subsequent "purges" took a toll in the oil industry as elsewhere, further complicating solutions of problems facing the industry, most important of which are: lack of capable and responsible leadership, able to make quick decisions; unsatisfactory and insufficient service of supply and highly undisciplined and "fluid" labor.

It is anticipated that the management will be granted more latitude in 1939, and somewhat better results will be promoted. But the providing of equipment and supplies probably will continue unsatisfactory, because of lack of competition among suppliers under government ownership. Labor conditions are expected to show some improvement, because of recent introduction of individual labor passports to all workers in the country, designed to prevent "fluidity" of labor.

U. S. S. R. crude oil production in 1938 is estimated at 224,714,000 barrels, an increase of 4.69 percent over the 212,742,000 barrels of 1937, although 12.76 percent less than the planned output. The older fields, Baku and Grozny, were barely able to maintain their 1937 levels of production, and increased output was supplied primarily by the fields of the Maikop and Ural districts. Although exploration was remarkably successful in 1937, no discoveries of consequence were made in 1938, due to a breakdown of drilling operations in wildcat areas.

Footage drilled in 1938 was under that of 1937, exploitation work having been only 70 percent of that planned while exploration work

Czechoslovakia

South extension of Hodonin field may bolster declining oil output

By BRANDON H. GROVE
Socony-Vacuum Oil Company, Inc., The Hague, Holland

Late in 1938, Apollo Company provided a south extension to the 20-year-old Hodonin field, which may bolster declining production. That field produced about 42,000 barrels in 1938, compared with 31,890 barrels in the previous year. The production is from depths of 425 to 485 feet, and the established productive area comprises about 175 acres.

Output of the government-owned Gbely field was moderately increased through the drilling of some new wells. From its 200 productive acres, this 25-year-old field produced approximately 95,000 barrels of oil in 1938, compared with 93,618 barrels in 1937. Two wells were completed in 1938. At the end of the year 5 wells were producing. The wells are 540 to 790 feet deep.

Work was begun in 1938 on a proposed 260 foot oil-mining shaft at Sokolnice, near Brno (Brunn); and construction was started on equipment for refining the crude oil directly from the sand as mined.

was not over 30 percent of that planned.

Turbine drilling was further experimented with in the Kala district of Baku. And in the Bibi-Eibat area of Baku field, an American made plunger lift was introduced and was reported to have quadrupled production, from 90 to about 300 barrels a day from 4000 feet.

Fields in the Apsheron Peninsula barely equaled their 1937 production record, having yielded 164,692,000 barrels in 1938, compared with 164,250,000 barrels in 1937. Wells are completed and produced flowing wide open, resulting in rapid water encroachment.

New drilling on the Apsheron Peninsula has been concentrated on the deepest known pre-Kirmaku sands of the Oil Measures. The deepest oil well in Russia was completed in July, 1938, at 10,640 feet.

Production of the Grozny area dropped to 17,612,000 barrels in 1938 from 20,800,000 barrels in 1937. The Gorski area was rapidly developed in the second quarter of the year, but wells were allowed to flow wide open, with great waste of gas, and Grozny production in the latter half of the year dropped far below planned output.

Production in the Maikop-Kuban district in the northwest Caucasus near the Black Sea reached 13,500,000 barrels in 1938, compared with only 10,000,000 barrels in 1937, and in the Ural Permian Basin production was up to 14,435,000 barrels from 9,700,000 barrels in 1937.

In other districts of the country, production was about unchanged. Development was slow in older areas, and pipe line facilities were not sufficient to handle potentially greater production in newer fields, such as Emba, Turkmen, Central Asia, and Aliat districts.

In 1938, Russian refineries ran to stills about 195,000,000 barrels of crude oil, or about the same amount as in 1937. Operations were handicapped by delays in construction of new plants. A large refinery at Moscow has been under construction 2½ years and one in Ufa for 3 years. Equipment is imported but becomes out of date before put into operation.

Exports from the U. S. S. R. in 1938 were probably 50 percent smaller than those of 1937, and in view of ever increasing domestic demand and difficulties of supplying even that demand, a complete cessation of exports in the immediate future is threatened.

Egypt

Five wells in new Ras Gharib field at end of 1938; Hurghada declines

In the new Ras Gharib field, discovered at the middle of 1938, five producing wells had been completed at the end of the year. The output from those wells meanwhile had totaled 73,494 tons.

The Hurghada field, which has been producing for 25 years, produced 146,063 tons of petroleum in 1938, compared with 163,518 tons in 1937, and the cumulative production since discovery has been 4,471,025 tons. The field also has continued to produce gas.

The daily oil production in December, 1938, was 373 tons, or about 5 tons per well from the 78 producing wells, all of which were pumping.

Proven productive area of Hurghada field is about 1050 acres, and the oil yield so far has averaged 4258 tons per acre from the pay zone of sand rock and sandstone, probably of Cretaceous age, found at depths of approximately 1600 to 1725 feet.

Development in 1938 embraced the drilling of 3 new wells, which brought the total number of completed productive wells of the field up to about 100, although 2 older wells were abandoned within the year.

At the end of 1938 there were 78 wells still producing in the field, and 22 productive wells had been abandoned, while 21 tests had gone onto the record as dry holes.

Hungary

Success in new field encourages exploration of Hungarian Plain

By BRANDON H. GROVE
Socony-Vacuum Oil Company, Inc., The Hague, Holland

Hungary became increasingly self-sufficient in crude oil supplies in 1938, through the rapid development of the Budafa-Puszta field, which was found in 1937. In addition to 1 gas well and 1 dry hole, 7 oil wells were completed in 1938. The oil wells had initial production of 150 to 400 barrels daily, flowing from pay horizons at 3700 to 4100 feet. The dry hole was a test drilled to 8226 feet.

At the end of the year, 7 oil wells, all flowing, were still producing, out of 10 productive wells completed up to that time. The 7 wells were yielding about 1400 barrels of oil daily, equivalent to a third of Hungary's domestic daily consumption. Total production of the field was 283,787 barrels in 1938, compared with 9,843 barrels in 1937. The productive area comprises about 1200 acres.

It was further indicated that the government controlled field at Bukkszek, discovered in 1937, would prove relatively significant. Its present productive area amounts to only about 200 acres. The field produced 41,064 barrels in 1938, compared with 9,300 barrels in 1937. Altogether, Bukkszek had had 35 completions up to the end of 1938, as 14 wells were completed in 1937 and 21 in 1938. However, some of the wells no longer produce. Abandonments in 1938 totaled 13 wells, and at the end of the year, only 12 wells were still producing, all by pumping and bailing, from the 335-340 foot pay zone.

(Continued on page 158)

World Oil Production Reflects Growth Abroad

Resumption of rising trend of output in 1939 likely, following interruption of that trend in 1938 through curtailment in United States.

IN view of an expected increase of around 5 percent in petroleum consumption in the United States in 1939, it is indicated that the crude oil output of that foremost producing country may show a similar gain; and consequently, a resumption this year of the usual rising trend of world oil production appears fairly well assured.

However, the world production in 1939 may fail to equal or exceed the all-time peak that was reached in 1937, when the total output of 2,042,007,000 barrels was above the 2-billion-barrel level for the only time in history.

Following the setting of that record in 1937, the world production of petroleum declined 3.3 percent in 1938, to approximately 1,975,640,000 barrels.

However, the decline in 1938 resulted largely from the important decrease of 5.2 percent in United States production, brought about by the business recession and less favorable demand for petroleum in that country. Production outside the United States was approximately the same in 1938 as in 1937.

Trend Abroad Upward

In recent years, the trend of crude production outside the United States has been consistently upward, except in 1938, when the output was about unchanged; and it is to be expected that an increase will occur in 1939, in line with the usual trend.

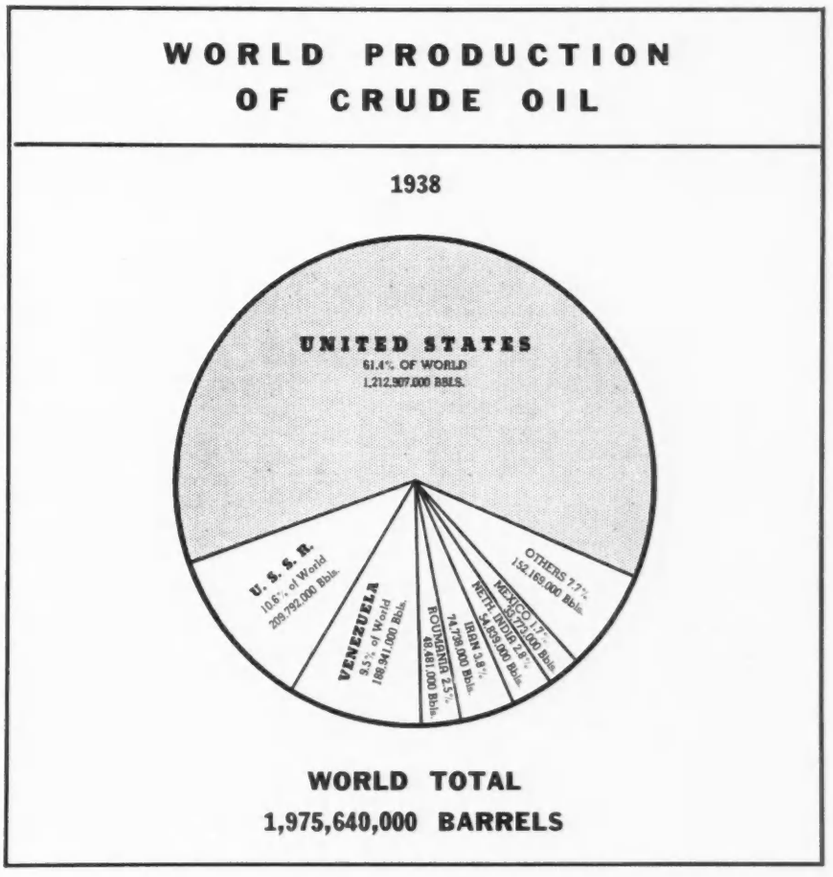
That indicated increase outside the United States and the probable expansion of output within the United States make a rise in world production this year appear virtually certain.

In consequence of a 5.2 percent decrease in output in 1938, to 1,212,907,000 barrels from 1,279,160,000 barrels in 1937, the United States became a little less dominant in the world production picture. The output for the year represented 61.4 percent of the world total, whereas that in 1937 had constituted 62.6 pecent of the world figure.

The aggregate production of countries outside the United States was approximately 762,733,000 barrels in 1938, which was practically the same as that of 762,847,000 barrels in 1937.

The six leading producing countries in 1938 were the same as those in 1937, but changes in rank among those countries occurred, by reason of a further substantial decline of output in Roumania, which consequently dropped behind Iran and Netherlands India, or from fourth to sixth place, while Iran moved up to fourth place from fifth and Netherlands India to fifth place from sixth.

While the United States maintained a long lead as the world's No. 1 producing country with its output of 1,212,907,000 barrels, constituting 61.4 percent of the world



total, U. S. S. R. retained second place, with an output of 209,792,000 barrels, which was equivalent to 10.6 percent of the world production for the year.

As in the previous year, however, U. S. S. R. was closely crowded by Venezuela, which produced 188,941,000 barrels, or 9.5 percent of the world output.

Iran produced approximately 74,738,000 barrels, which accounted for 3.8 percent of the world output.

The production of about 54,839,000 barrels in Netherlands India constituted 2.8 percent of the world total.

Although Roumania had produced 52,176,000 barrels in 1937, the output in that country totaled

World Crude Oil Production, by Countries, by Years

Complete Production History of World, in Barrels of 42 U. S. Gallons

(Sources.—*Mineral Resources* of the United States, 1918, 1930 and 1931; *Minerals Yearbook*, 1932, 1933 and subsequent years. Note: The figures of *Mineral Resources*, 1918, have been replaced here by figures from later reports, in cases where revisions have been made.)

YEAR	Rumania	United States	Italy	Canada	Russia except Sakhalin	Poland (Galacia)	Japan and Taiwan	Germany	India (British)	Netherland India	Peru	Mexico	Argentina	Trinidad	YEAR
1857	[A]1,977														1857
1858	3,560														1858
1859	4,349	[A]2,000													1859
1860	8,542	500,000	[A]36												1860
1861	17,279	2,113,609	29												1861
1862	23,198	3,056,690	29	[A]11,775											1862
1863	27,943	2,611,309	58	82,814	[A]40,816										1863
1864	33,013	2,116,109	72	90,000	64,586										1864
1865	39,017	2,497,700	2,265	110,000	66,542										1865
1866	42,534	3,597,700	992	175,000	83,052										1866
1867	50,838	3,347,300	791	190,000	119,917										1867
1868	55,369	3,646,117	367	200,000	88,327										1868
1869	58,533	4,215,000	144	220,000	202,308										1869
1870	83,765	5,260,745	86	250,000	204,618										1870
1871	90,030	5,205,234	273	269,397	165,129										1871
1872	91,251	6,293,194	331	308,100	184,391										1872
1873	104,036	9,893,786	467	365,052	474,379										1873
1874	103,177	10,926,945	604	168,807	583,751	[A]149,837									1874
1875	108,569	8,787,514	813	220,000	697,364	158,522	[A]4,566								1875
1876	111,314	9,132,669	2,891	312,000	1,320,528	164,157	7,708								1876
1877	108,569	13,350,363	2,934	312,000	1,800,720	169,792	9,560								1877
1878	109,300	15,396,868	4,329	312,000	2,400,960	175,420	17,884								1878
1879	110,007	19,914,146	2,891	575,000	2,761,104	214,800	23,457								1879
1880	114,321	26,286,123	2,035	350,000	3,001,200	229,120	25,497	[A]9,310							1880
1881	121,511	27,661,238	1,237	275,000	3,601,441	286,400	16,751	29,219							1881
1882	136,610	30,349,897	1,316	275,000	4,537,815	330,076	15,549	58,025							1882
1883	139,486	23,449,633	1,618	250,000	6,002,401	365,160	20,473	26,708							1883
1884	210,667	24,218,438	2,855	250,000	10,804,577	408,120	27,923	46,161							1884
1885	193,411	21,858,785	1,941	250,000	13,924,596	465,400	29,237	41,360							1885
1886	168,606	28,064,841	1,575	584,061	18,006,407	305,884	37,916	73,864							1886
1887	181,907	28,283,483	1,496	525,655	18,367,781	343,832	28,645	74,284							1887
1888	218,576	27,612,025	1,251	695,203	23,048,787	466,537	37,436	84,782							1888
1889	297,666	35,163,513	1,273	704,690	24,609,407	515,268	52,811	68,217	[A]94,250						1889
1890	383,227	45,823,572	2,998	795,030	28,691,218	659,012	51,420	108,296	118,065						1890
1891	488,201	54,292,655	8,305	755,298	34,573,181	630,730	52,917	108,929	190,131						1891
1892	593,175	50,514,657	18,321	779,753	35,774,504	646,220	68,901	101,404	242,284						1892
1893	535,655	48,431,066	19,069	798,406	40,456,519	692,669	106,384	99,390	298,969	[A]600,000					1893
1894	507,255	49,344,516	20,552	829,104	36,375,428	949,146	[B]173,000	122,564	327,218	688,170					1894
1895	575,200	52,892,276	25,843	726,138	46,140,174	1,452,999	170,000	121,277	371,536	1,215,757					1895
1896	543,348	60,960,361	18,149	726,822	47,220,633	2,443,080	237,000	145,061	429,979	1,427,132	[A]47,536				1896
1897	570,886	60,475,516	13,892	709,857	54,399,568	2,226,368	262,000	165,745	545,704	2,551,649	70,831				1897
1898	776,238	55,364,233	14,489	758,391	61,609,357	2,376,108	319,000	183,427	542,110	2,964,035	70,905				1898
1899	1,425,777	57,070,850	16,121	808,570	65,954,968	2,313,047	539,000	192,232	940,971	1,795,961	89,166				1899
1900	1,628,535	63,620,529	12,102	913,498	75,779,417	2,346,505	871,000	358,297	1,078,264	2,253,355	274,800				1900
1901	1,678,320	69,389,194	16,150	756,679	85,168,556	3,251,544	1,117,000	313,630	1,430,716	4,013,710	274,800	[A]10,345			1901
1902	2,059,935	88,766,916	18,933	530,624	80,540,044	4,142,159	996,000	353,674	1,617,363	2,430,465	286,725	40,200			1902
1903	2,763,117	100,461,337	17,876	486,637	75,591,256	5,234,475	1,209,000	445,818	2,510,259	5,770,056	278,092	75,375			1903
1904	3,599,026	117,080,960	25,476	552,575	78,536,655	5,947,383	1,219,000	637,431	3,385,468	6,508,485	[B]290,000	125,625			1904
1905	4,420,987	134,717,580	44,027	634,095	54,960,270	5,765,317	1,347,000	560,963	4,137,098	7,849,896	373,000	251,250			1905
1906	6,378,184	126,493,936	53,577	569,753	58,897,311	5,467,967	1,564,000	578,610	4,015,803	8,180,657	531,000	502,500			1906
1907	8,118,207	166,095,335	59,875	788,872	61,850,734	8,455,841	1,718,000	756,631	4,344,162	9,982,597	751,000	1,005,000	[A]101		1907
1908	8,252,157	178,527,355	50,966	527,987	62,186,447	12,612,295	1,871,000	1,009,278	5,047,038	10,283,357	945,000	3,932,900	11,472	[A]169	1908
1909	9,327,278	183,170,874	42,388	420,755	65,970,350	14,932,799	1,887,000	1,018,837	6,676,517	11,041,852	1,411,000	2,713,500	18,431	57,143	1909
1910	9,723,806	209,557,248	50,830	315,895	70,336,574	12,673,688	1,829,000	1,032,522	6,137,990	11,030,620	1,258,000	3,634,080	20,753	142,857	1910
1911	11,107,450	220,449,391	74,709	291,096	66,183,691	10,519,270	1,737,000	1,017,045	6,451,203	12,172,949	1,465,000	12,552,798	13,119	285,307	1911
1912	12,976,232	222,935,044	53,778	243,336	68,019,208	8,535,174	1,659,000	1,031,050	7,116,672	10,845,624	1,752,000	16,558,215	47,007	436,805	1912
1913	13,554,768	248,446,230	47,198	228,080	62,834,356	7,818,130	1,940,000	[D]857,000	7,930,149	11,172,294	2,071,000	25,696,291	130,618	503,616	1913
1914	12,826,579	265,762,535	39,849	214,805	67,020,522	[D]6,436,000	2,636,000	781,000	7,409,792	[D]11,422,000	1,837,000	26,235,403	275,500	643,533	1914
1915	12,029,913	281,104,104	43,898	215,464	68,548,062	5,352,000	2,928,000	703,000	8,202,674	11,920,000	2,579,000	32,910,508	[D]513,000	750,000	1915
1916	8,945,029	300,767,158	50,585	198,123	[D]65,817,000	6,587,000	2,963,000	656,000	8,491,137	12,547,000	2,593,000	39,817,402	867,000	928,581	1916
1917	3,720,760	335,315,601	40,763	213,832	63,072,000	6,228,000	2,861,000	642,000	8,078,843	13,180,000	2,577,000	55,292,770	1,218,000	1,602,312	1917
1918	[D]8,730,000	355,927,716	[D]35,000	304,741	27,168,000	6,032,600	2,441,000	270,000	[D]8,188,000	12,778,000	2,527,000	[D]63,828,000	1,353,000	2,082,068	1918
1919	6,618,000	[D]378,367,000	35,000	[D]241,000	31,752,000	6,096,000	2,238,000	265,000	8,736,000	15,508,000	2,628,000	87,073,000	1,331,000	[D]1,841,000	1919
1920	7,435,000	442,929,000	35,000	196,000	25,430,000	5,607,000	2,221,000	246,000	8,375,000	17,529,000	2,817,000	157,069,000	1,651,000	2,083,000	1920
1921	8,368,000	472,183,000	32,000	188,000	28,968,000	5,167,000	2,233,000	274,000	8,734,000	16,958,000	3,699,000	193,398,000	2,036,000	2,354,000	1921
1922	9,843,000	557,531,000	31,000	179,000	35,692,000	5,227,000	2,055,000	319,000	8,529,000	17,066,000	5,314,000	182,278,000	2,866,000	2,445,000	1922
1923	10,867,000	732,407,000	34,000	170,000	39,147,000	5,402,000	1,804,000	346,000	8,406,000	19,870,000	5,699,000	149,585,000	3,400,000	3,051,000	1923
1924	13,369,000	713,940,000	39,000	161,000	45,355,000	5,657,000	1,814,000	406,000	8,416,000	20,473,000	8,379,000	139,678,000	4,639,000	4,057,000	1924
1925	16,650,000	763,743,000	61,000	332,000	52,448,000	5,960,000	1,915,000	541,000	8,274,000	21,422,000	9,232,000	115,515,000	6,336,000	4,387,000	1925
1926	23,314,000	770,874,000	41,000	364,000	64,311,000	5,844,000	1,785,000	653,000	8,011,000	21,243,000	10,762,000	90,421,000	7,851,000	4,971,000	1926
1927	26,368,000	901,129,000	47,000	477,000	77,018,000	5,342,000	1,789,000	663,000	8,032,000	27,459,000	10,127,000	64,121,000	8,630,000	5,380,000	1927
1928	30,773,000	901,474,000	46,000	624,000	[D]84,745,000	5,492,000	1,944,000	630,000	8,741,000	32,118,000	12,006,000	50,151,000	9,070,000	7,684,000	1928
1929	34,758,000	1,007,323,000	45,000	1,117,000	[D]99,507,000	4,988,000	2,023,000	704,000	8,747,000	39,279,000	13,422,000	44,688,000	9,391,000	8,716,006	1929
1930	42,759,000	898,011,000	59,000	1,522,000	[D]125,555,000	4,904,000	2,047,000	1,222,000	8,887,000	41,729,000	12,449,000	39,530,000	9,002,000	9,419,000	1930
1931	49,741,000	851,081,000	124,000	1,543,000	162,842,000	4,662,000	1,966,000	1,608,000	8,715,000	35,539,000	10,089,000	33,039,000	11,709,000	9,744,000	1931
1932	53,815,000	785,159,000	208,000	1,044,000	154,367,000	4,116,000	1,630 000	1,608,000	8,817,000	39,001,000	9,899,000	32,805,000	13,139,000	10,126,000	1932
1933	54,020,000	905,656,000	204,000	1,145,000	154,840,000	4,072,000	1,455,000	1,665,000	8,743,000	42,606,000	13,257,000	34,001,000	13,691,000	9,561,000	1933
1934	62,063,000	908,065,000	151,000	1,417,000	174,318,000	3,913,000	1,834,000	2,187,000	10,503,000	46,925,000	16,314,000	38,172,000	14,024,000	10,894,000	1934
1935	61,310,000	996,596,000	119,000	1,447,000	182,386,000	3,812,000	2,250,000	2,996,000	9,219,000	47,171,000	17,067,000	40,241,000	14,297,000	11,671,000	1935
1936	63,655,000	1,099,687,000	120,000	1,500,000	197,418,000	3,788,000	2,445,000	3,115,000	9,566,000	50,026,000	17,593,000	41,028,000	15,458,000	13,237,000	1936
1937	52,176,000	1,279,160,000	107,000	2,978,000	199,475,000	3,708,000	2,487,000	3,177,000	9,852,000	56,275,000	17,467,000	46,907,000	16,236,000	15,503,000	1937
1938[1]	48,481,000	1,212,907,000	103,000	8,002,000	207,372,000	3,827,000	2,497,000	4,263,000	9,867,000	54,839,000	15,894,000	33,773,000	16,269,000	17,677,000	[1]1938
Total	827,791,176	21,186,793,719	2,613,718	49,072,770	3,989,784,907	255,059,251	77,560,035	41,771,041	283,520,365	849,661,621	238,466,855	1,898,655,162	185,494,001	162,233,391	Total

[A] Actual numbers of barrels are shown prior to 1918, as reported in *Mineral Resources*, 1918; except in cases where revisions have been made in later reports, with such revisions being in thousands of barrels.

[B] Figures beginning with this year are shown in nearest thousand barrels, being from *Mineral Resources* of 1930, and 1931: and from *Minerals Yearbook* in subsequent years.

[C] Production of France in previous years credited to Germany.

[D] No more data available.

only 48,481,000 barrels, or 2.5 percent of the world total, in 1938.

Mexico retained its former rank as seventh among the world's leading oil producing countries, although output was down sharply, from 46,907,000 barrels in 1937 to 33,773,000 barrels in 1938. The latter amount represented 1.7 percent of the world production for the year.

At the greatly reduced level of production in 1938, following the expropriation of the oil properties by the government, Mexico barely remained ahead of Iraq. The latter country produced approximately 31,096,000 barrels in 1938, compared with 30,604,000 barrels in 1937.

World Crude Oil Production, by Countries, by Years—(Continued)

Complete Production History of World, in Barrels of 42 U. S. Gallons

(Sources.—*Mineral Resources* of the United States, 1918, 1930 and 1931; *Minerals Yearbook*, 1932, 1933 and subsequent years. Note: The figures of *Mineral Resources*, 1918, have been replaced here by figures from later reports, in cases where revisions have been made.)

YEAR	Egypt	Iran (Persia)	British Borneo (Sarawak And Brunei)	Algeria	Ecuador	Venezuela	France	England	Czechoslovakia	Sakhalin	Colombia	Iraq	Bolivia	Bahrein Island	Other Countries	Total World	Percent Produced by U.S.	YEAR
1857																1,977		1857
1858																3,560		1858
1859																6,349	31	1859
1860																508,578	98	1860
1861																2,130,917	99	1861
1862																3,091,692	99	1862
1863																2,762,940	94	1863
1864																2,303,780	92	1864
1865																2,715,524	92	1865
1866																3,899,278	92	1866
1867																3,708,846	90	1867
1868																3,990,180	91	1868
1869																4,695,985	90	1869
1870																5,799,214	91	1870
1871																5,730,063	91	1871
1872																6,877,267	92	1872
1873																10,837,720	91	1873
1874																11,933,121	92	1874
1875																9,977,348	88	1875
1876																11,051,267	83	1876
1877																15,753,938	85	1877
1878																18,416,761	84	1878
1879																23,601,405	84	1879
1880																30,017,606	88	1880
1881																31,992,797	86	1881
1882																35,704,288	85	1882
1883																30,255,479	78	1883
1884																35,968,741	67	1884
1885																36,764,730	59	1885
1886																47,243,154	59	1886
1887																47,807,083	59	1887
1888																52,164,597	53	1888
1889																61,507,095	57	1889
1890																76,632,838	60	1890
1891																91,100,347	60	1891
1892																88,739,219	57	1892
1893																92,038,127	53	1893
1894																89,336,953	55	1894
1895																103,691,200	51	1895
1896																114,199,101	53	1896
1897																121,992,016	50	1897
1898																124,978,293	44	1898
1899																131,146,663	44	1899
1900																149,136,302	43	1900
1901															20,000	167,440,644	41	1901
1902															26,000	181,909,038	49	1902
1903															36,000	194,879,298	52	1903
1904															40,000	217,948,084	54	1904
1905															30,000	215,091,483	63	1905
1906															30,000	213,263,298	59	1906
1907															30,000	263,956,355	63	1907
1908															30,000	285,287,421	63	1908
1909															20,000	298,708,724	61	1909
1910															20,000	327,763,863	64	1910
1911	[B]21,000														20,000	344,361,028	64	1911
1912	214,000														20,000	352,443,145	63	1912
1913	98,000	[B]1,857,000	[B]141,000												20,000	385,345,730	64	1913
1914	753,000	2,910,000	318,000	[B]1,000											20,000	407,542,518	65	1914
1915	212,000	3,616,000	392,000	4,000											10,000	432,033,623	65	1915
1916	404,000	4,477,000	629,000	8,000											25,000	456,771,015	66	1916
1917	943,000	7,147,000	542,000	9,000	[B]57,000	[B]120,000	C								29,000	502,889,881	67	1917
1918	1,935,000	8,623,000	504,000	7,000	[E]60,000	333,000	[B]363,000								25,000	503,514,525	71	1918
1919	1,517,000	10,139,000	596,000	5,000	[E]60,000	425,000	334,000	[B]2,000	[B]48,000						20,000	555,875,000	68	1919
1920	1,042,000	12,230,000	1,020,000	4,000	[E]60,000	457,000	356,000	3,000	69,000						20,000	688,884,000	64	1920
1921	1,255,000	16,673,000	1,411,000	3,000	[E]60,000	1,433,000	389,000	3,000	94,000	[B]2,000	[B]67,000				20,000	766,002,000	62	1921
1922	1,188,000	22,247,000	2,849,000	9,000	[E]60,000	2,201,000	496,000	1,000	120,000	7,000	323,000				22,000	858,898,000	65	1922
1923	1,054,000	25,230,000	3,940,000	9,000	87,000	4,201,000	494,000	1,000	74,000	9,000	425,000				24,000	1,015,736,000	72	1923
1924	1,122,000	32,373,000	4,163,000	11,000	[E]100,000	9,042,000	497,000	2,000	76,000	80,000	445,000				24,000	1,014,318,000	70	1924
1925	1,226,000	35,038,000	4,257,000	12,000	160,000	19,687,000	459,000	3,000	158,000	87,000	1,007,000				23,000	1,068,933,000	71	1925
1926	1,188,000	35,842,000	4,942,000	9,000	214,000	36,911,000	478,000	2,000	150,000	181,000	6,444,000				17,000	1,096,823,000	70	1926
1927	1,267,000	39,688,000	4,943,000	8,000	537,000	63,134,000	504,000	2,000	112,000	440,000	15,014,000	[B]338,000			13,000	1,262,582,000	71	1927
1928	1,842,000	43,461,000	[G]5,223,000	8,000	1,084,000	105,749,000	512,000	1,000	94,000	677,000	19,897,000	713,000			15,000	1,324,774,000	68	1928
1929	1,868,000	42,145,000	5,290,000	20,000	1,381,000	137,472,000	535,000	D	93,000	[E]1,134,000	20,385,000	798,000	H		38,000	1,485,867,000	68	1929
1930	1,996,000	45,833,000	4,907,000	16,000	1,553,000	136,669,000	523,000	H	157,000	[E]1,805,000	20,346,000	909,000	[B]56,000		40,000	1,411,905,000	64	1930
1931	2,038,000	44,376,000	3,854,000	D	1,762,000	116,613,000	527,000	D	134,000	2,734,000	18,237,000	900,000	25,000		54,000	1,373,656,000	62	1931
1932	1,895,000	49,471,000	3,796,000	D	1,597,000	116,541,000	530,000	D	126,000	2,631,000	16,414,000	836,000	44,000		62,000	1,309,677,000	60	1932
1933	1,663,000	54,392,000	4,490,000	D	1,620,000	117,720,000	562,000	D	122,000	2,338,000	13,158,000	917,000	112,000	31,000	71,000	1,442,112,000	63	1933
1934	1,546,000	57,851,000	5,140,000	D	1,637,000	136,103,000	557,000	D	178,000	2,881,000	17,341,000	7,689,000	159,000	285,000	96,000	1,522,243,000	59.7	1934
1935	1,295,000	57,304,000	5,546,000	4,000	1,732,000	148,529,000	539,000	D	133,000	2,545,000	17,595,000	27,311,000	164,000	1,265,000	144,000	1,654,688,000	60.2	1935
1936	1,277,000	62,699,000	5,343,000	3,000	1,951,000	154,794,000	535,000	D	127,000	2,218,000	18,752,000	30,307,000	105,000	4,645,000	394,000	1,801,786,000	61.0	1936
1937	1,149,000	78,741,000	6,026,000	22,000	2,161,000	185,701,000	503,000	D	123,000	2,380,000	20,293,000	30,604,000	122,000	7,763,000	911,000	2,042,007,000	62.6	1937
1938[I]	1,494,000	74,738,000	7,085,000	D	2,260,000	188,941,000	517,000	D	129,000	2,420,000	21,451,000	31,096,000	106,000	8,484,000	1,148,000	1,975,640,000	61.4	[I]1938
Total	33,502,000	869,101,000	87,347,000	172,000	20,193,000	1,682,776,000	10,210,000	20,000	2,317,000	24,569,000	227,594,000	132,418,000	893,000	22,473,000	3,607,000	33,165,670,012	63.9	Total

[E] Year ended September 30.
[F] Estimated.
[G] Beginning of production from Brunei.
[H] Less than one thousand barrels.

[I] For 1938, figures for countries outside the United States are preliminary, having been estimated by THE OIL WEEKLY.

New Areas Assure Much Drilling in Trinidad

Activity in 1939 may exceed 905,878 feet drilled in 1938; production trend is up; industry faced with higher labor costs; wildcatting will continue on island.

By VICTOR BRYAN
La Brea, Trinidad

THE prediction made in THE OIL WEEKLY last year to the effect that the total crude oil production of Trinidad oil fields would attain a minimum figure of 17,500,000 barrels for 1938 has been proved by results. The official figure has now been declared as 17,737,061 barrels.

This production figure represents yet another successive record and shows an increase of 14.4 percent when compared with the total for 1937, and an increase of 52 percent when compared with the total for 1935.

Moreover, this production increase was achieved with relatively the same amount of drilling (and the completion of only four more wells during 1938) as compared with the previous year, when a total of 15,502,989 barrels was obtained.

At the end of 1938, there were 35 drilling strings in use on the island, as against 43 at the end of 1937.

Prospects Good

Prospects for 1939, however, continue to be good, but the general outlook for the future of the industry locally must necessarily be considered as influenced in some appreciable measure by prevailing low United States of America crude prices and existing local labor conditions.

This, of course, must not be taken to mean that the bright long-term perspective previously forecast for the industry has altered in any material way. Actually, it is only the rapidity with which advances towards this long-view goal will be made that must, at this time, be regarded as speculative.

Trinidad, however, still remains in its place as the largest oil producer within the British Empire, and the advantageous location of the island as a supply source during any period of national emergency will, naturally, incline the trend of affairs in favor of a more or less maintained development pace.

A reasonable presumption, therefore, is that present conditions will probably give the industry a slight temporary set-back, and while certain proposed exploratory work may in some way be delayed, any material drop during 1939 in crude recovery and general operating activity should not now be anticipated.

Labor a Deterrent

It must, however, be borne in mind that 1938 is to be looked upon as a period of very intensive activity in all directions, and that actual results would have been even somewhat better, were it not for the handicap suffered by reason of certain partial labor strikes which occurred on some fields. On present showing, the industry will be faced with somewhat higher labor costs during 1939, and it is when this situation is contrasted with the probable price realizations (as indicated by present United States trends) that speculation enters on the question of whether or not any increase or decrease will be effected in the operating tempo which existed during 1938.

Comments, however, on this situation, otherwise than by those who actually hold the reins of the industry, can, at this time, only be in the nature of vague conjecture.

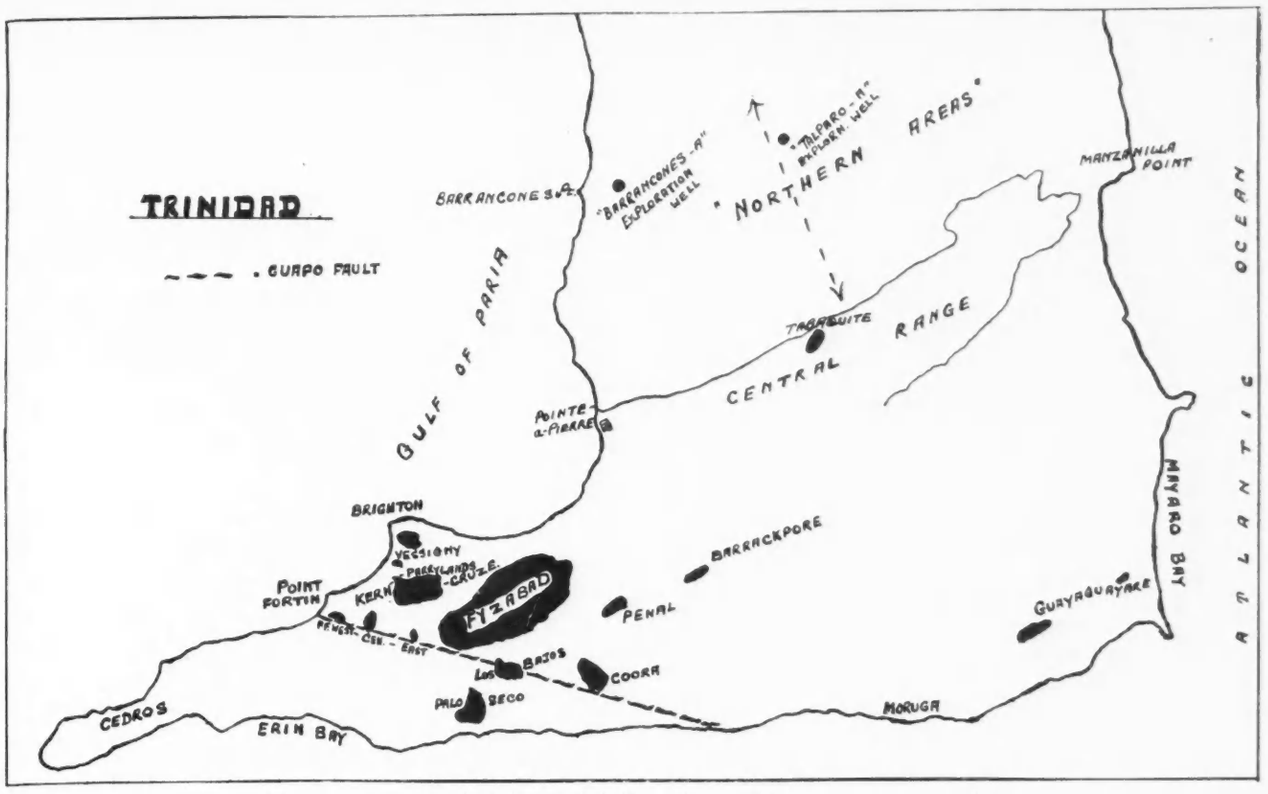
1938 Results

Through the expressed courtesy of the government petroleum technologist's department, the actual figures for operating results achieved during 1938 have been made available in time for the present article. The significant index factors as contained in these figures have been set down in the following tabulations on a comparative basis. These tabulations should serve as an advantageous point from which the general outlook for 1939 could be contemplated in the light of the opening remarks made on existing conditions.

TABLE 1

Trinidad Field Statistics

	1937	1938
Total Footage Drilled	911,575	905,878
Total Production Obtained	15,502,989	17,737,061
Number of Strings Drilling as at End of Year	43	35
Total Number of Wells Completed	249	253



Showing new and old fields in Trinidad discussed in accompanying article

The monthly details for footage drilled and production obtained are shown in Table 2.

TABLE 2

	FOOTAGE		PRODUCTION	
	1937	1938	1937	1938
January	75,996	78,753	1,263,456	1,378,021
February	64,958	84,822	1,157,668	1,304,819
March	77,417	79,632	1,287,097	1,438,436
April	72,619	74,722	1,301,250	1,418,825
May	85,426	76,825	1,351,198	1,481,285
June	52,905	72,200	928,752	1,431,847
July	66,273	77,544	1,377,549	1,500,171
August	93,347	72,416	1,433,474	1,505,959
September	80,465	79,967	1,358,600	1,514,893
October	91,794	74,207	1,393,317	1,594,480
November	86,049	74,778	1,300,720	1,503,489
December	64,326	60,012	1,349,908	1,664,836
	911,575	905,878	15,502,989	17,737,061

Classifying the actual number of producing wells at the end of 1938, under production methods headings, we find, as expressed in Table 3, most of the oil coming from flowing wells.

TABLE 3

428	Flowing Wells gave	69.7% of the total production
516	Pumping Wells gave	19.8% of the total production
81	Gas Lift	
123	Plunger Lift Wells gave	10.5% of the total production
156	Other Methods	
1304		100.0%

Most significant also in the assesssment of portable conditions for 1939 is the instance of a large expansion in refining and processing facilities on the island, both recently completed and now in hand.

A considerable improvement reported in the sale of Trinidad motor spirits in the United Kingdom, together with an increased demand, as announced in the English press, for supplies from Trinidad sources to the British air ministry and other important aviation undertakings, have stimulated further efforts at expansion and the setting down of new plants, in order to take advantage of this increased demand.

Increasing Refinery Capacity

There are only two large refineries and four small topping plants on the island, altogether handling approximately 95 percent of the industry's total crude output. A program of expansion carried out at the Trinidad Leaseholds' Pointe-a-Pierre refinery, in which a considerable portion of the work was carried out during 1938, has, it is understood, put this plant in shape for handling some 30,000 barrels of crude daily. It has been reported that some $750,000 have been spent on this project, and it is now significant to note that the United British Oilfields of Trinidad, Limited, has already embarked on a refinery expansion and construction program at Point Fortin which, on the face of it, would require an almost similar sum to see completion of the undertaking. When this shall have been completed, it is estimated that the crude processing facilities on the island will be capable of handling an amount between 60,000 to 65,000 barrels daily.

Both these large refineries are also the biggest local buyers of crude from other operating companies, and it is anticipated that with their own increased well production, refining facilities on the island should be runnng right up to capacity during 1939.

Thus, this can be taken as putting up a situation whereby any partial lull in drilling activity should be

more or less well compensated for by the probable increased acceleration resulting from the additional refinery processing carried on.

Oil exports valued at $23,656,561 represented about 69 percent of the colony's total export trade during 1938, and this was an increase of $4,760,139 over 1937.

Fuel oil for ship's bunkers topped the list of oil exports and was represented by a value of $11,348,-699 while the value of motor spirits exported was $9,987,296.

The number of motor cars imported into the colony was 639 as against 781 in 1937.

To Seek Reserves

Otherwise than the current exploitation drilling which is carried on by the majority of the operating rigs, 1939 drilling events will be directed, substantially, at finding additional reserves and proving the extension of new production discovered during 1938.

The discovery and commercial opening up within the last two years of the Coora field by Trinidad Petroleum Development Company has brought about a concentration of drilling by competitive companies holding boundary lands.

This new Coora field is located on a major fault running from a point on the northwest "toe" of the island, across to the central southern coast, as indicated roughly on the accompanying sketch map. Production has been established as existing on both sides of the fault, so that a considerable area occurring in the territory between the Los Bajos, Coora and Palo Seco fields can be considered as proven.

Southeast of Coora, some encouraging results have been reported in exploration work being carried out at Morne Diablo, and several successful wells recently drilled between the Fyzabad and Los Bajos fields also augment appreciably the increase in proven territory.

Fields Extended

The Penal and Barrackpore fields have also been somewhat further extended during the past year, and the Point Fortin main field has found some prolific additions to the east and west.

Excellent yields have been reported from the deeper sand horizons in the Fyzabad field commonly known as the "G" and "H" sands.

The above, together with the advanced exploration work being carried out at Cedros, Mayaro, Moruga and Point Ligoure (southwest of Point Fortin), and to a lesser extent in the "Northern Areas" should move the island's potential production for 1939 up by some 2 to 3 million barrels at the least.

Thus, it will be seen that new drilling should more than offset normal production decline during the coming year, and that with any luck, it will be several years yet before Trinidad oil production reaches the peak point wherefrom it will begin to flatten out and descend.

To Test Virgin Areas

In this connection it is interesting to remark that two tests have been inaugurated almost simultaneously in the wholly virgin (and hitherto little thought of) territory between the Northern and Central Ranges, called the Northern Areas. The location of these tests have come subsequent to a considerable amount of seismographic and general reconnaissance work carried out over the territory during the course of the last few years. The last few articles on Trinidad appearing in THE OIL WEEKLY dealt at some length with this phase of the island's exploratory work (then proposed) and it is only now necessary to mention that no stone seems likely to be left unturned in the endeavor to subject this area to some intensive testing by the drill.

The approximate locations of these two wells have been marked in roughly on the accompanying sketch map so as to give a general idea of the area of this exploration program.

Living camps have already been established in the locality and indications are that, successful or otherwise, drilling will continue in the Northern Areas for some considerable time to come. As previously reported, this venture is a joint Shell-Trinidad Leaseholds interest: thus, one well is being drilled under the supervision of the United British Oilfields of Trinidad, Limited (Shell subsidiary), and the other under the supervision of Trinidad Leaseholds, Limited, the latter with direction from the technical department at Pointe-a-Pierre.

Using Heavy Rigs

Both rigs are of the improved Diesel type and everything has been set up in anticipation of depths running below 10,000 feet. The greatest depth attained on the island so far is 9033 feet, in the Fyzabad field. This was done with a regular rotary rig.

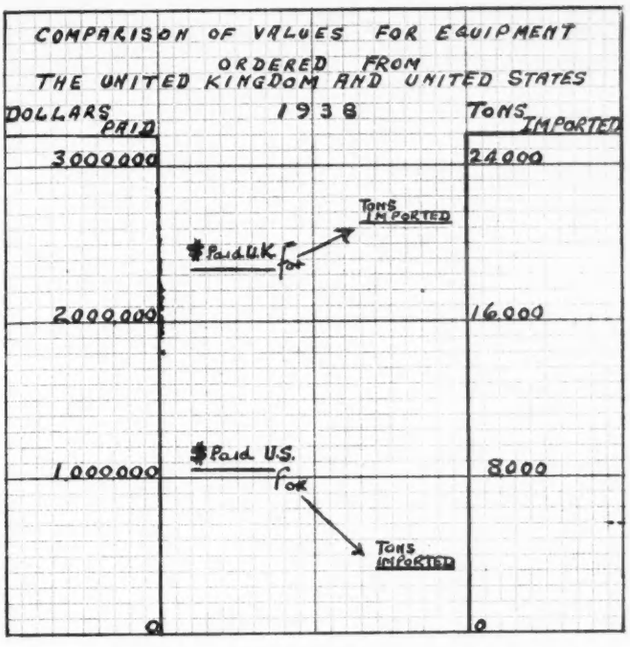
According to rumors, persistently current in good quarters, it would not be surprising if a competitive company decides (on account perhaps of drilling obligations) to put in a third test in this territory, even before completion of either of the two now under way.

Geophysical surveys in the central eastern portion of the island, in the vicinity of Manzanilla, are now in progress, in continuation of the vast amount of such work carried out in previous years, especially during 1938.

So far, no agreement has been reached between Government and applicant oil companies for concessions over marine oil rights in the territorial waters of the colony. It will be recalled that the companies were asking for individual allocations, whereas the government was insisting on the working of such areas by one joint operating company in which all applicants have been invited to participate. The situation still appears to be deadlocked.

Geological Conference

Following the lead set by the Venezuelans across the Gulf of Paria who have already held two geological conferences in the neighboring republic, Trinidad geologists plan to hold a conference in Trinidad, commencing April 19, 1939. It is expected that the same will be attended by a large number of geologists from Venezuela and Colombia. The academical benefits which are expected to accrue on this account must tend towards a more ready solution of the several complicated local geological problems now existing. This, incidentally, brings up the fact that the most absorbing topic of discussion among Trinidad geologists today seems to be the pros and cons of the theory that the bulk of Trinidad oil orig-



Note: Germany, Canada, Belgium and Czechoslovakia also supplied some oil field materials to Trinidad.

inated in the oldest rocks occurring in the south (Cretaceous) and migrated upwards into the shallower structures by means of fault planes. No doubt, this theory has been stimulated considerably by the marked success achieved in territory developed recently along the major fault line sketched in on the accompanying map. This is a point which may engage some of the congress time.

Equipment

More than ever now, it is anticipated that the trend towards adoption, at the earliest possible moment, of the latest proven scientific devices for the furtherance of the effort at more efficient and faster drilling will be adhered to.

Programs for heavy exploration drilling and outstepping wells in semi-exploration territory are constantly calling for deeper and deeper holes, straight-drilled for probable future pumping—this in turn calling for higher derricks (136-foot, for instance, in the Northern Areas) and greater hoisting capacities and speeds: This along with all the other concomitants of deeper and faster drilling in unknown territory with probable high pressure conditions.

In exploitation areas, the general tendency can be summed up as inclining towards the strict standardization of operating equipment and practices, for individual areas, based of course on the correlated experience of a great number of years.

Demands on the foreign equipment market have been reported to show a marked *increase* during 1938, but to have *lowered* somewhat during the past few weeks.

Oil field pipes, tubes and fittings headed the values of last year's import figures for different commodities used on the island. This figure is given as $3,959,621 while the value against machinery, in general, is quoted as $3,509,193.

There have been 21,035 tons of oil field materials represented as coming from the United Kingdom, with a corresponding figure for the United States of America of 3243 tons. These imports represent expenditures of $2,317,203 and $1,049,423 respectively. The greater amount of other general machinery, however, was listed as bought from the United States.

Summary

Summarizing, with regard to prospects of the industry for 1939, it must be remembered that no predictions can be made with any real degree of assurance at the present time. The following factors should, however, be borne in mind: (1) The reported increased demand for Trinidad motor spirits in the United Kingdom, and the local refining facilities program consequent thereon. (2) The exploratory drilling which has already been commenced in the "Northern Areas," and which, before the end of the present year, is likely to alter the oil map of the island considerably, possibly extending it upwards from the south—with the foot of the Northern Range as its limit (the Northern one-third portion of the island is Metamorphic rock). The Central third of the island may thus be opened to oil prospects. (All present oil fields, as found, are located in the southern third of the island.) (3) The current prolific yields being obtained from the deeper sands in the Fyzabad area, and the sustained increase which development of this prospect is likely to put on the island's total yield. (4) Greater probable development of the recently discovered Coora field and other territory along the major fault line on which this new field is located. (5) The great quantity of other exploration work continuing in hand from 1937 and 1938, some of which already show promising results. (6) A possible solution during 1939 of the deadlock which now ties up an acreage of approximately 390,000 acres of submarine land over which exploration for oil is contemplated.

Based on the above alone, as the more significant of the factors likely to influence the trend of operations in the Trinidad petroleum industry, it may be said that the year 1939 should produce results, if not very much better in actual figures, at least not worse than the year 1938.

In any event the ground that will be cleared for future development in purely wildcat territory should be considerable.

Pictures courtesy of H. Pollard, Calgary

Two of Turner Valley's oil field communities. Above is Main Street of Little New York. Below is Main Street of Little Chicago. Both were taken in May, 1938.

Canada Looks Forward to Much Activity in 1939

Thousands of undrilled acres added to proven area of Turner Valley; 1938 footage greatest in nine years; production largest in history.

TURNER VALLEY, Canada's principal oil field, experienced its most important development year during 1938 from the standpoint of wells and footage drilled, production and important field extensions. Wildcat activity in Western Canada continued at an encouraging pace, but was without outstanding developments, while in Ontario a shallow oil field was opened.

Turner Valley's 40 completions of the year included only two dry holes, and compared with 33 producers and 1 dry hole drilled on the structure in 1937. Producing wells of the past year account for two-thirds of the field's allowable production.

Early solution of a marketing problem, while not as serious as indicated by some spokesmen for Western Canada's growing oil industry, would dispel a threat to drilling activity and would guarantee development during 1939 at an increasing rate.

Undefined On Three Sides

The crude area of Turner Valley is undefined except on the east, where it meets the old gas or naphtha area. A test to the extreme west of the proven area found salt water in the lower Madison lime horizon, but was being commercially completed in the upper Madison porous zone. A strip a mile wide lies between the outpost and the developed area. The southern limit of the field is undefined, while a near completion at the year's end 12 miles northwest of the main crude area promised a new pool or to triple the present crude area.

Wells completed during the year, outside of the extreme westerly test and the strike far north on the structure, extended the proven crude area on the southwest flank one mile to the south, making the proven area 5 miles in length, and ¼ mile to the west, making it 1½ miles wide.

Additional drilling will have to determine the value of the indicated upper limestone completion west of the southwest flank main producing area, but the performance of the near completion 12 miles to the north assures a drilling campaign in that area. This year's drilling should determine whether the structure numbers two distinct crude pools, or whether they are linked in a field 17 or more miles long. Several tests for

the intervening area have been announced and will be drilling by early spring.

Probably the most notable development in Turner Valley, from a long-range view are the steps taken during the year toward systematic operation of the field. Conservation measures have been instituted to correct production practices which, in the opinion of many petroleum engineers, would have destroyed the field within from 3 to 5 years. Estimates of the field's production life, in view of controlled production practices instituted during 1938, range from 20 to 46 years.

Most pressing problem remaining of solution at the year's end was extension of markets for Alberta crude. Extended negotiations with representatives of railway companies had thus far failed to bring a preferential rate for the product to permit movement to the large consuming centers in the east or over the Rocky Mountains to Vancouver and other Pacific Coast centers. Testimony of petroleum engineers before a provincial royal commission investigating the oil and natural gas industry, however, indicated that delay in extending the market for Alberta crude beyond the prairie provinces could not be blamed for the slight decline in drilling activity late in 1938.

Cementing casing on Royalite Oil Company's No. 30 at Turner Valley when the mercury stood at 30 below zero.

Production Practices Changed

A change in production practices that came during the year with institution of proration and conservation, while forced by a limited market, brought careful study of the 2½-year-old field and general publicity to the fact that continued operation of wells at their capacity or open flow would bring an early demise to the crude oil area. Until the royal commission's inquiry was started late in 1938, public discussion regarding the growing field was in condemnation of proration which was declared to be stopping the flow of eastern capital for development. Little or nothing was said about the ultimate effect of permitting crude wells to flow wide open as had been the general practice until late in 1937.

Testimony of petroleum engineers, both Canadian and experts brought in from the United States, before the royal commission was to the effect that Turner Valley, on the basis of present development, should not be permitted to produce more than its present allowable of approximately 12,500 barrels daily. Before the commission's inquiry opened there was much said about the field's "potential capacity" of over 50,000 barrels daily and the effect of cutting the field to "one-fourth of its normal production."

An allowable of 12,500 barrels daily represents market requirements for Turner Valley crude in an off-consuming season. There are, at present, no facilities for storing large quantities of either crude or refined products during the winter months for use in the peak consuming season, which in the prairie provinces extends well into the fall months because of the demand for oil for harvesting.

More Outlets Promised

Scheduled completion early this year of a large refinery at Calgary by British American Oil Company, Ltd., and announced additions to the plants of Imperial Oil Company, Ltd., at Calgary and Regina, promise additional outlets for Turner Valley crude and provide an inducement to additional drilling. Construction of additional storage for use in winter months to permit uniform operation of wells throughout the year is being seriously considered by operators, refining companies and the provincial government, and it is not unlikely that a program along this line may be adopted during 1939.

In the 2½ years that it has emerged from a naphtha or minor oil area into a major crude field, Turner Valley has passed through the period of frenzied and economically unsound activity that marked previous Alberta oil booms with practically no loss to the investing public. This is in sharp contrast with earlier Alberta booms, noted for intensive stock and royalty sale promotions and relatively little drilling or oil.

Deepest Well

With the drilling of Okalta Oils, Ltd.'s No. 6, Legal Subdivision 3, Section 30, Township 18, 2-w5, deep drilling records for Canada were broken. The well, the westerly outpost to the southwest flank main producing area, drilled to 10,200 feet, the lower Madison porous horizon, where salt water was

found. It was being commercially completed in the upper Madison.

Second deepest well drilled during the year was Home Oil Company, Limited's Millarville 2, Legal Subdivision 6, Section 33, Township 20, 3-w5. The test is 12 miles northwest of the southwest flank producing area. Drilled to 8495 feet, it indicated flush production of 3500 barrels daily following treatment with 3000 gallons of acid shortly after the close of 1938.

Canada Drilled 350,000 Feet

With the exception of 1929, when capital was plentiful and extensive drilling was in progress to three small oil-producing sands in the Blairmore formation in Turner Valley, footage drilled in Alberta during 1938 was greater than in any previous year. The sands are the McDougall-Segur, Home and Dalhousie, found between 2400 and 4900 feet, which yielded from 30 to 100 barrels initial in wells completed in 1927 and shortly thereafter. Most wells drilled to the Blairmore were deepened to the Palaeozoic limestone, known locally as the Madison, when production from the upper sands declined below profitable operation.

First productive drilling in Turner Valley dates back to May 14, 1914, when Dingman 1, started 16 months earlier, encountered oil in commercial quantities at 2718 feet. It was not until June, 1936, however, when Turner Valley Royalties' No. 1 was completed in the Paleozoic limestone at 6828 feet with a flow of 850 barrels a day of 44 degree A.P.I. oil, that active development of the crude area on the southwest flank started. This well resulted from progressive westward extension of the gas naphtha area. Its completion as a crude well was forecast by the steady dip in the structure that was noted by westward drilling in the naphtha field and a gradual change-over from naphtha to crude in wells farther north on the structure, indicating that crude oil in quantity might be present down the west flank in the same porous zone, but below the level of the gas which filled the top of the structure.

Figures on footage drilled in Alberta during the past 11 years, broken down to show Turner Valley separate from the rest of the province, appear in Table 1.

TABLE 1
Footage

Year	Turner Valley	Others	Total
1927	53,340	31,626	84,966
1928	111,160	56,380	167,540
1929	240,020	130,577	370,597
1930	123,583	105,751	229,334
1931	61,939	54,613	116,552
1932	13,096	19,525	32,621
1933	51,806	20,043	71,849
1934	78,278	17,946	96,224
1935	27,461	33,011	60,472
1936	52,470	46,145	98,615
1937	245,531	46,423	291,954
1938*	300,000	50,000	350,000

*Estimated.

TABLE 2
Comparative Alberta Production Data

Month	1936 Barrels	1937 Barrels	Increase 1936 to 1937	1938 Barrels	Increase 1937 to 1938
January	105,171	127,977	22,806	444,196	316,219
February	96,077	140,515	44,438	401,587	261,072
March	101,857	161,832	59,975	467,732	305,900
April	94,230	172,608	78,378	447,241	274,633
May	98,789	175,997	77,208	546,719	370,722
June	97,639	191,634	93,995	521,895	330,261
July	122,771	226,000	103,229	678,243	452,243
August	124,287	271,898	147,611	799,023	527,125
September	120,210	281,154	160,944	867,454	586,300
October	120,638	325,723	205,085	667,454	341,731
November	113,794	326,677	212,883	427,236	100,559
December	124,979	394,893	269,914	*400,000	*6,107
Total	1,320,442	2,796,908	1,476,466	*6,669,265	*3,872,357

*Estimated.

Alberta oil production in 1938, of which almost 99 percent was accounted for by Turner Valley, gained 137 percent over the previous year, and was more than five times the 1936 yield. Production in 1938 was approximately 88.5 percent Turner Valley crude recovered from the limestone, 10 percent Turner Valley naphtha recovered from the limestone, and 1.5 percent Turner Valley crude oil recovered from shallow horizons above the limestone, plus production from other Alberta fields.

Production Up 137 Percent

Comparative production figures for the province by months in 1936, 1937 and 1938, with supplementary columns showing the increase in 1937 over 1936 and the increase in 1938 over 1937, appear in Table 2.

The relation of Turner Valley, which, as pointed out, accounts for 99 percent of all Alberta production, to the crude oil production of the entire Dominion of Canada, is strikingly portrayed by Table 3, which gives production by provinces for 1937 and 1938, the gain or increase in barrels, and the relation of each province's production to production of all Canada in 1938, given on a percentage basis.

A comprehensive picture of Alberta's oil production for the last 25 years can be gained from Table 4, showing production by calendar years:

Several tests have been started south of National Petroleum Corporation, Ltd.'s 2, the present southernmost producing well in the southwest flank crude area. This well, in Legal Subdivision 14, Section 9, Township 18, 2-w5, encountered a fault in the lower Madison but was commercially completed in the upper porous zone. It had an allowable of 205 barrels a day under a Petroleum & Natural Gas Conservation Board order issued December 5. It is 1 mile directly

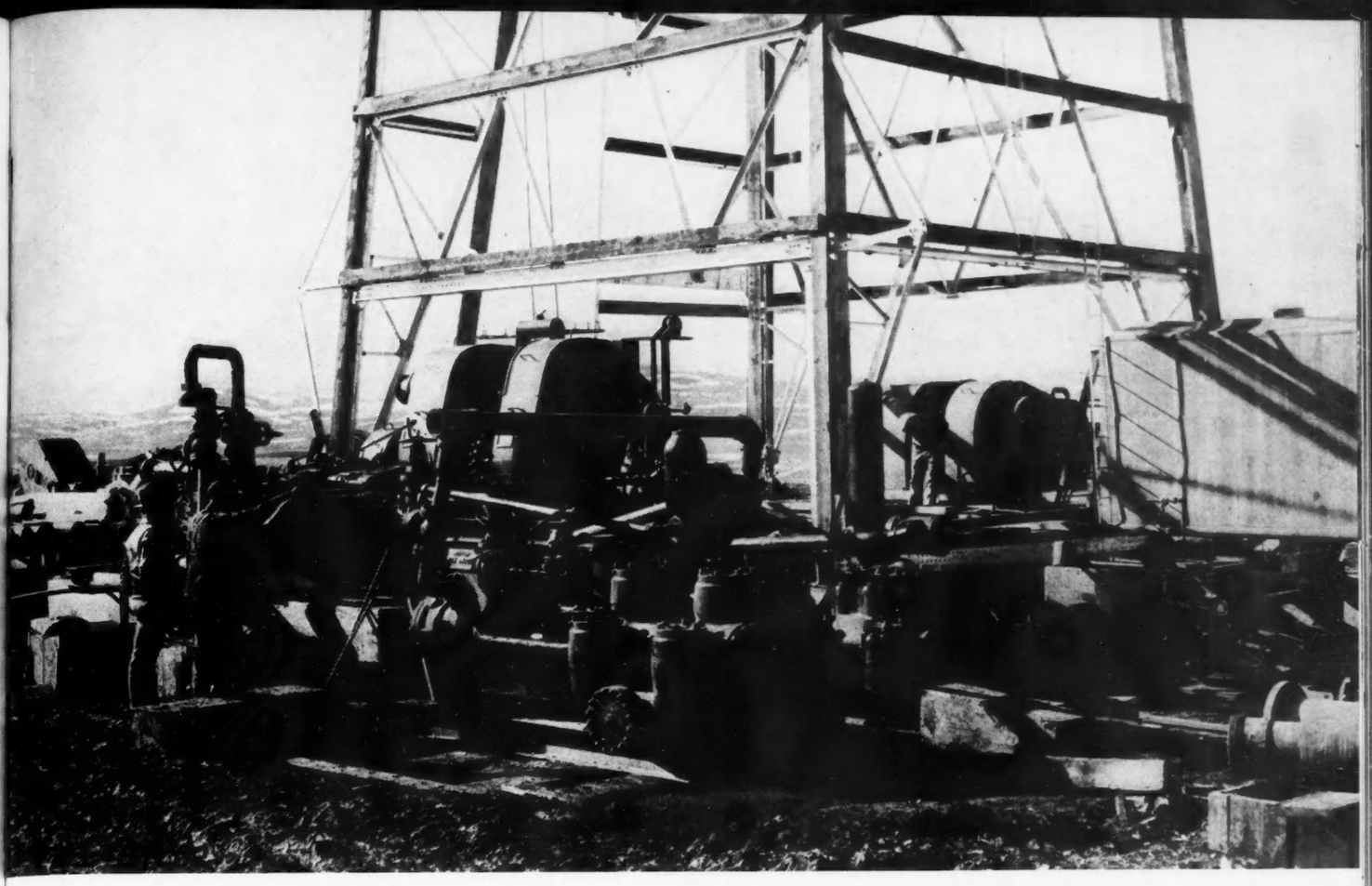
TABLE 3
Production of Canadian Provinces

Province	1937 Barrels	1938 Barrels*	Gain Barrels	Percentage
Alberta	2,796,908	6,669,265	3,872,357	97.05
New Brunswick	22,481	24,000	1,519	.35
Northwest Territories	11,371	10,000	—1,371	.15
Ontario	165,478	168,250	2,772	2.45
Total	2,996,238	6,871,515	3,875,277	100.00

*1938 figures are estimated as December production has not been determined.

TABLE 4
Alberta Production

Year	Barrels
1914 to 1924, inclusive	96,504
1925	168,643
1926	219,598
1927	332,133
1928	489,531
1929	999,152
1930	1,433,844
1931	1,455,195
1932	917,622
1933	1,013,040
1934	1,265,940
1935	1,263,750
1936	1,320,442
1937	2,796,908
1938	6,669,265
Total, 1914 to 1938	20,441,567



This type of rotary rig is used in getting down to Madison limestone, the main producing horizon of Turner Valley.

south of Brown Oil Corporation, Ltd.'s No. 1, which a year ago marked the southern boundary.

The Okalta deep well to the extreme west is 1¼ miles west and almost 1 mile south of Commoil, Ltd.'s 1, which a year ago marked the western boundary of the proven area. Midway between the Commoil and Okalta wells, but 1 mile north of the Commoil test, Anglo-Canadian Oil Company, Ltd.'s 1 was completed in the lower porous Madison at 8222 feet and given a temporary allowable of 290 barrels daily.

Extension Attempt Fails

An attempt to extend the southwest flank area 3 miles north and slightly west failed when Brown Oil Corporation, Ltd.'s No. 3, Legal Subdivision 1, Section 18, Township 19, 2-w5, was abandoned early in the year at 6777 feet. Neither nitro shots nor acid would make the well, which had an oil show in the Madison, into a commercial producer. At an elevation of 4354 feet, the outpost encountered the Bentons at 1440 feet, the Upper Pebble Bed at 2100 feet, Cardium at 2420 feet; Upper Pebble repeat at 3210 feet; Cardium repeat at 3390 feet; Lower Pebble at 3490 feet; Jumping Pound at 4410 feet; Ben Blair at 4820 feet; Home sand at 5830 feet; Dalhousie sand at 6090 feet; Blair-Koot at 6110 feet; Koot-Fernie shale at 6200 feet; Belemnite at 6280 feet; Fernie limestone at 6319 feet, and dark lime at 6765 feet.

Failure of the Brown 3 and another well 1½ miles northwest, Dalhousie Oil Company, Ltd.'s 8, Legal Subdivision 11, Section 30, Township 19, 2-w5, indicates the connection, if any, that exists between the southern crude area and the Home company's well 12 miles to the north lies farther west and at best is quite narrow. Dalhousie 8 was drilled in 1937 to 6911 feet and was abandoned after unsuccessfully shooting the limestone and gun perforating the casing opposite the Dalhousie and Brown sands.

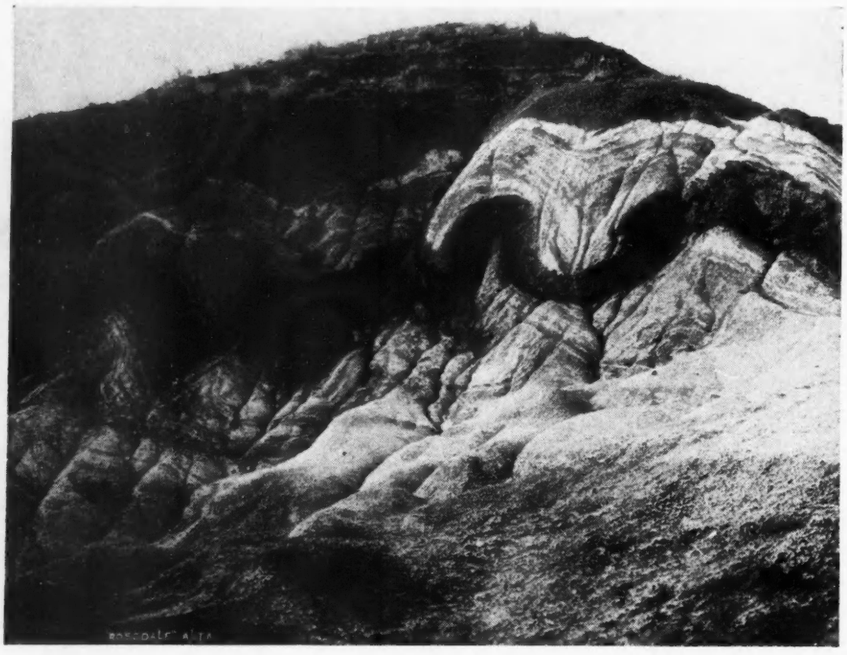
Directly between the Brown 3 and the Dalhousie 8, Advance Oil Company, Ltd.'s 5A on Legal Subdivision 16, Section 19, Township 19, 2-w5, is producing under an allowable of 74 barrels daily. The well had originally been completed as a naphtha producer, and gradually changed over to crude. In the opinion of most geologists, some unknown structural conditions cut off the oil in the area of the Brown and Dalhousie failures.

Millarville Area

Home Oil Company, Ltd.'s Millarville 2 is not entirely alone in the nothern area. Earlier last year, Royalite Oil Company, Ltd.'s 29 was completed 1½ miles southeast on Legal Subdivision 2, Section 27, Township 20, 3-w5, at 6920 feet. The well, started on June 13, 1929, as Turner Basin, resumed as a Royalite property in 1937. Its allowable, under the conservation board's December 5 order, was 161 barrels daily. This test encountered the Cardium at 890 feet, the Ben-Blair at 2250 feet, a Blair-Ben fault at 3230 feet; Ben-Blair repeat at 3630 feet; Dalhousie at 5510 feet; Home sand at 5230 feet; Blair-Koot at 5540 feet; Koot-Fernie at 5870 feet; Belemnite at 6120 feet; Fernie-Lime at 6220 feet and dark lime at 6920 feet. Its first potential was about 100 barrels daily, but open flow production was boosted to five times that amount following acid treatment.

One mile directly south of Royalite's 29, on Legal Subdivisions 1 and 8, Section 22, Township 20, 3-w5, two Model Oil Company wells drilled several years ago changed over from naphtha to crude producers.

It was not until near completion



Outcrop of coal seam in badlands at Steveville structure, on which two wildcats are drilling and location.

of the Home company's big well at the year's end, however, that interest was directed to any degree toward the crude oil prospects of the northwest flank. The structure extends for at least 7 miles beyond the Home well, and a test for a location one mile north as well as several for the 12-mile stretch between the Home well and the southwest flank crude area have been announced. Currently drilling just one location north of Royalite's 29 is that company's No. 35.

Board Established

The Petroleum and Natural Gas Conservation Board was established during the year with W. F. Knode, Texas consulting engineer and conservation expert, as chairman. Other members of the board are C. W. Dingman, formerly director of the petroleum and natural gas division of the Alberta department of lands and mines, and F. G. Cottle, former auditor of the board of public utility commissioners. The board established offices in Calgary, near the Turner Valley field.

A system of setting allowables based on a formula including factors of gas/oil ratio, bottom hole pressure, well spacing and measured flow through a two-inch nipple was adopted by the board. It replaced a system used earlier in the year based on open flow production, without regard to gas/oil ratio.

The board also took steps to halt the waste of gas by naphtha wells, which was rapidly depleting pressure at crude wells farther west on structure, by holding gas production to 40,000,000 cubic feet daily. Half of the allowable production was declared sufficient to supply Calgary, Lethbridge and other communities and the other 20,000,000 cubic feet to supply the needs of the industry in Turner Valley. Estimates on the amount of gas previously burned as waste ran as high as 150,000,000 cubic feet daily.

Tariff Board Investigation

Besides the provincial inquiry into the Alberta oil industry started late in the year, an investigation by the Federal Tariff Board was started January 27, 1937, on the petition of the Petroleum Producers' Association of Alberta and the Alberta government. Purpose of the federal inquiry was to examine evidence as to consumption of petroleum products in Western Canada, sources of supply, present refining facilities in the west, suggested programs for increasing refining facilities, and transportation costs of laying down imported and Turner Valley oil at different points.

Successful marketing of Alberta crude production hinges upon freight rate levels low enough to permit competition in the eastern Canadian market with crude moved by pipe line from United States fields and in the British Columbia market with crude moved in from California. Alberta operators had hoped that the Board of Railway Commissioners would recommend adjustments in freight rates that would make extension of markets beyond the prairie provinces possible.

The federal board investigation

Outcrop on north end of the east flank of Turner Valley.

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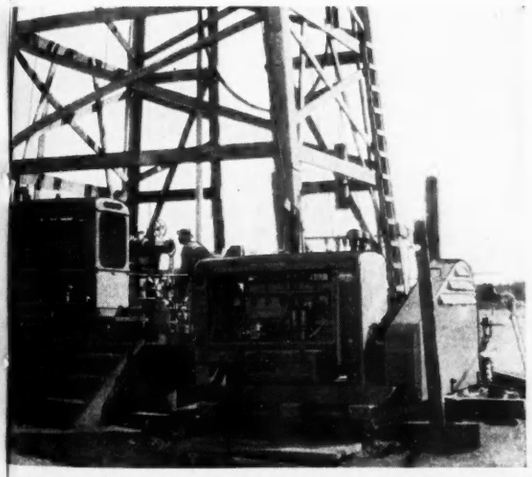

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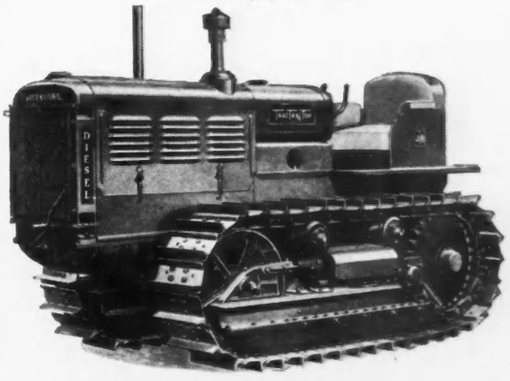

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Welding Royalite Oil Company's pipe line from Turner Valley to Calgary, refining and shipping center of Alberta.

adjourned to permit representatives of operators and Canada's two major railway systems to discuss freight rates, officials of Imperial Oil Company, Ltd., and British American Oil Company, Ltd., having assured operators that they would take immediately from 6000 to 7000 barrels of Turner Valley crude if it could be delivered at Sarnia, Ontario, at a price that would compare favorably with the product now coming from United States fields. These negotiations were still in progress at the year's end.

A definite result of the federal inquiry, which stands adjourned with no date set for resuming, was assurance by Royalite Oil Company, Ltd., that it would complete an additional 6-inch pipe line from Turner Valley to Calgary, increasing the carrying capacity of the company's system to 24,000 barrels a day. The new line was placed in operation on May 7, 1938.

Proposed Line Projects

With hopes of gaining preferential freight rates on crude from the railroad companies diminishing with each passing month, increased interest is directed to pipe lines for movement of crude beyond the prairie provinces. Considerable preliminary work has been done on three separate proposed projects. One contemplates a line south to connect with Montana fields and then west to the Pacific coast. A second involves an 800-mile line to Fort William, at the head of the Great Lakes, from which point crude would be moved an additional 1000 miles to Sarnia. The third proposes a 640 mile line to Vancouver, British Columbia.

Considerable interest in a line to the west coast has been aroused among Vancouver business groups. A special fact-finding committee of the Mining Bureau of the Vancouver Board of Trade in late December made a special survey with special reference to the possibilities of exporting Alberta oil through the port of Vancouver.

The report pointed out that extension of the market for Alberta oil is essential to encourage further large scale development, and that such market extension appeared to depend upon reduced railway freight charges or construction of pipe lines. At existing rates, movement of crude westward is not economic as the product must compete with waterborne oil and gasoline from California and South America.

In any consideration of railway or pipe line movement of oil from Turner Valley to Vancouver it must be borne in mind that the field is at an elevation of about 3400 feet, with the highest railway elevation, at Stephen, British Columbia, at 5337 feet, and the terminal point at sea level, the report pointed out. The gradient to the sea favors economical transportation.

Creer's Report on Line

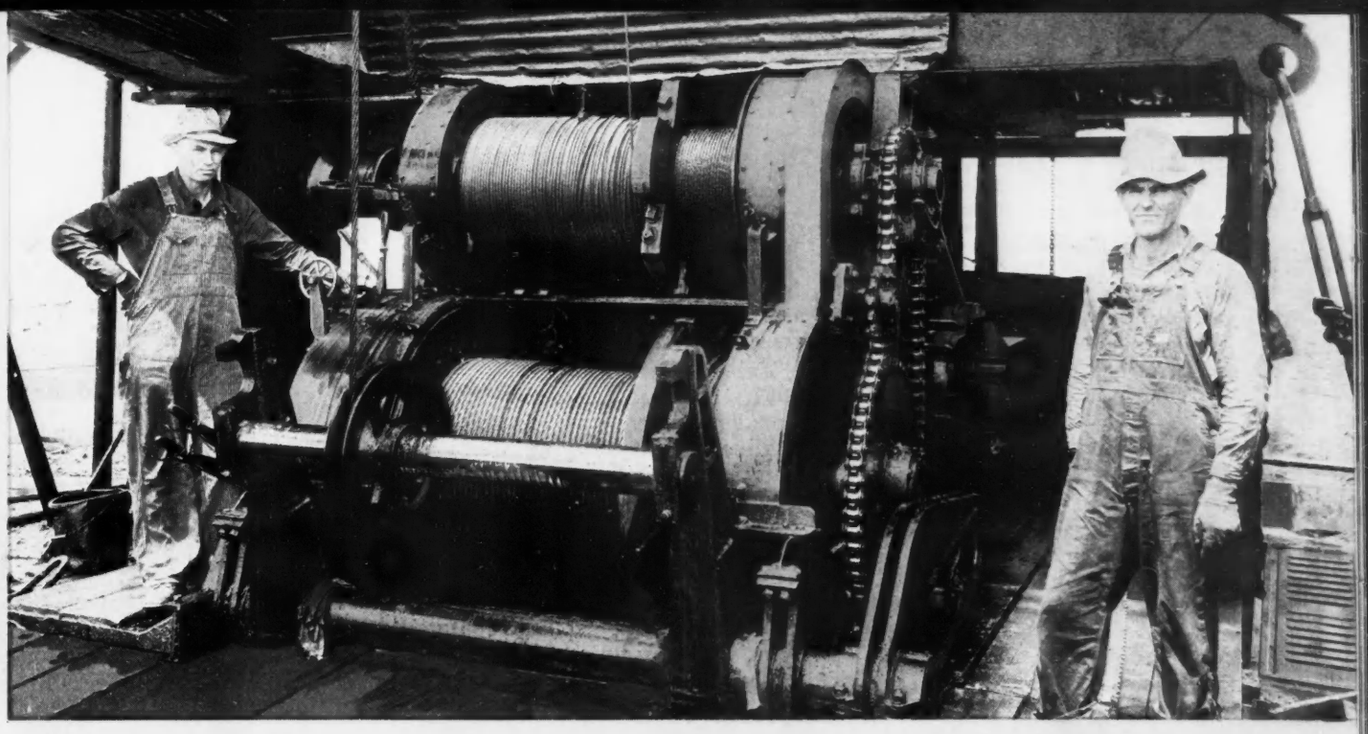
On a specific section regarding construction of a pipe line from Alberta to Vancouver, A. D. Creer, M.E.I.C.M.I.C.E., member of the committee, made the following report, which, while it did not take into account conservation in the interest of preserving Turner Valley's life, is of interest in view of additional development:

"The potential production of the Alberta field is given by Mr. J. L. Irwin, statistician of the Alberta department of lands, July, 1938, at 50,000 barrels a day, and I am assuming that 60 percent, or 30,000 barrels, would be available for pipe line custom, if not at once, in the immediate future.

"The distance from Calgary to Vancouver, via the Canadian Pacific Railway, is 650 miles, and although the Rocky and Selkirk summits involve, in each case, a lift of nearly 2000 feet, there are no unsurmountable engineering difficulties.

"The distance from Edmonton to Vancouver on the Canadian National Railway is 770 miles and the grades are more favorable. With the possibility of the oil fields extending north and the fact that Edmonton is some 1250 feet lower than Calgary, and might make a better collecting point, the advantages of this route should not be lost sight of.

"On the limited information and data available, I estimate the cost of an 8-inch pipe line from Calgary to Vancouver, with a capacity of 30,000 barrels per day, at $20,000,000. An expenditure of $35,000,000 would be required for a 12-inch pipe line from Calgary to Van-



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Tulsa, Oklahoma

P. O. BOX 559

January 27, 1939

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Two years ago last October, we bought our first Cardwell rig, a Model R Double Drum Combination Draw Works. This Model R performed so well and gave us such good service that we bought another Model R the following May. We purchased the third in December, 1937 and fourth Model R in March, 1938.

We have found your equipment to be the most practical we have used for drilling wells as deep as 3600 or 3700 feet, and we have experienced no difficulty in drilling in wells as deep as 4400 feet with your draw works and spudding attachment. In many instances we have rigged up and drilled in wells for less money than the installation cost of standard rig front, and we can bail and swab faster than with standard front.

We think our motors and equipment are in as good condition as they were when we purchased them, and they have been in service practically twenty-four hours a day.

Our repair bills have not been excessive and your service has been quite satisfactory.

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COMMERCIAL DRILLING COMPANY

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By S. R. Mealy

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JACK BROWN
Calgary, Alberta
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couver, via Edmonton, with a capacity of 71,000 barrels per day. I believe both the figures to be reasonably safe and not likely to be exceeded.

"Assuming an 80 percent factor on the line, the annual delivery at Vancouver would be 9,000,000 barrels. As regards the rate that could be charged, Mr. W. A. Rundle quotes a 62 cents per barrel from the Mid-Continent field to Sarnia, a distance of just over 1000 miles. the charges by some other pipe line companies in the states are:

"Cushing to Chicago, 700 miles, 46 cents; Cushing to St. Louis, 410 miles, 37½ cents; Cushing to Bayonne, New Jersey, 1460 miles, 76½ cents, plus, in each case, a gathering charge.

"On these figures, I suggest a rate of 45 cents a barrel would be reasonable," Creer continued. "This would give a gross annual revenue of about $4,000,000, and with interest and depreciation charges at 10 percent, would leave $2,000,000 a year for other operating expenses —a figure which gives a very ample margin for any possible contingencies.

"The cost of Alberta crude, laid down at Vancouver, would be:

Field price	$1.10	$1.20	$1.30
Gathering charge ..	.20	.20	.20
Pipe line charge.....	.45	.45	.45
Per barrel	$1.75	$1.85	$1.95

New Field in Ontario

The sole new field opened during the year was in Warrick Township, Lambton County, Ontario, where Bert Wilson et al's Loftus McLean 1 was completed at 480 feet and pumped 25 barrels initial. Additional drilling in the area during the year brought 15 producers, some with initial production as high as 100 barrels daily.

Except for one or two instances, scientific exploration methods to discover oil in Ontario have never been employed. This despite the fact that the province, which is the largest Canadian consuming market for petroleum products, lies largely within the Michigan basin. Developments of recent years in Michigan are awakening an interest on the Canadian side to the possibility that certain sections of Ontario might profitably respond to modern exploration methods and deep drilling. Work along this line may be undertaken by one or two companies during the current year.

Among developments on western wildcat structures were:

Clearwater structure, Alberta—Canyon Oil Company, Ltd., & Calgary Gas Company's Altoba 1, Section 31, Township 34, 9-w5, was testing a lime saturation found between 1196 and 1286 feet.

Taber field, Alberta—Opened in 1937, this area, near the international border, saw considerable drilling activity during the year, but with inconclusive results. Completion of wells in the area is difficult because of water intrusion. Considerable crude was shipped from the field in 1938, and while 7 wells are drilling or in preliminary stages on widely separated locations, results have not been sufficiently encouraging to remove the structure from the wildcat classification.

Lloydminster gas field, on the Alberta - Saskatchewan border—Shortly after the turn of this year, Lloydminster Royalties, Ltd.'s No. 1, Legal Subdivision 4, Section 36, Township 49, 1-w4, encountered crude at 1925 feet and filled 1000 feet in the hole. Bailing of 150 barrels in a 24-hour period failed to lower the column. The wildcat was an intended test of the Madison lime, but may be completed at about its present depth.

Much Wildcatting

On 29 other Alberta wildcat structures, 39 tests had been started or were located for spring drilling. Practically all operations that had been started were shut down for the winter months.

Indicative of the continued search for oil in Alberta are crown leases on petroleum and natural gas rights. Such leases active at the year's end embraced an approximate 1,000,000 acres, compared to 630,148 acres at the close of 1936.

The following summary in chronological order of Alberta's oil history is given by J. L. Irwin, statistician of the provincial department of mines:

1878—Oil occurrences in the Athabaska district reported on by George M. Dawson, director of the Dominion Government Geological Survey. At a later date, Dr. Bell, of the same department, published a report on the bituminous sands of McMurray.

1883—Oil discovered in the area now known as Waterton National Park, which precipitated a boom at Calgary.

1885—Drilling of Alberta's first well at Langevin, now known as Anderson, near Medicine Hat, which resulted in the discovery of dry gas.

1890—First productive gas well drilled at Medicine Hat.

1894—First well drilled at Athabaska Landing. Gas flow encountered. Abandoned in autumn of 1895 at a depth of 1335 feet due to a fishing operation proving unsuccessful. In the summer of 1896, the tools were moved from the well and the drilling outfit taken down the Athabaska River, where another well was started at Pelican Rapids. A strong flow of gas was encountered at 800 feet which prevented water being lowered to the bottom. Gas blew for years. The well eventually caught fire and burned for several years before being finally extinguished by a natural cave-in.

1900—First well drilled in the Bow Island gas field, 50 miles west of Medicine Hat. This field supplied Calgary with natural gas for a number of years until the supply became exhausted.

1904—Drilling resumed at Pelican Rapids. Three wells were completed and an oil and gas belt was located.

1914—First well in Turner Valley brought into production, followed immediately by a second. Depth of these wells were 1557 and 2718 feet.

War Period—Viking gas field supplying Edmonton and towns in vicinity of pipe line with natural gas brought into production.

1922—Turner Valley drilling resumed and famous Royalite No. 4 well started—eventually came in and stayed in production for over six years, yielding a total of 911,313 barrels of naphtha valued at over $3,000,000 during that period. With Royalite No. 4's development, established drilling became extremely active in this sector until the start of the depression years in 1930.

1936—Discovery of high-grade crude oil in encouraging quantities in the limestone made in June in the southern section of Turner Valley on the western flank of the structure. The Turner Valley Royalites well was the first to demonstrate the new production in this sector.

Explorations in Iran and Afghanistan*

By FREDERICK G. CLAPP,
Consulting Geologist, New York

DURING the years 1937 and 1938 extensive geological reconnaissances were conducted, under the direction of the writer, covering a large region in eastern Iran and the entire territory of Afghanistan. The area under consideration was that portion of the two countries situated east of an arbitrarily-chosen arc-like line, running from Bander-i-Shah at the southeast corner of the Caspian Sea, south and southeast by way of Damghan, Jandaq and points near Ravar, to Irafshan near the frontier of British Baluchistan, the total area being about 435,000 square miles.

Large Area Covered

The distribution of the work through 800 miles of latitude and 1,000 miles of longitude gave an unexcelled opportunity for stratigraphical and structural studies on a vast scale. Geologists and others associated with the writer's field work were Khadji Afshar, Bennett Frank Buie, E. Gardner Clapp, Ernest F. Fox, Henry Hotchkiss, Howard M. Kirk, Gordon L. Postle, Henry C. Rea, Dr. Frank Reeves, Dr. Hubert G. Schenck, Lester S. Thompson and Walter Wilson. The studies were made possible owing to the unceasingly helpful attitude of the imperial Iranian government which, with its officials and the people of Iran, is highly commended for uniform friendship and cooperation during the period of the work.

General Description

The altitudes and physiography of Afghanistan and eastern Iran are very diverse. Elevations range from the summit of Mount Demavend, supposed to be 18,549 feet high, to the level of the Caspian Sea which stands 84 feet below the ocean. The region consists in general of high plateaux, with the exception of lowland plains in (firstly) a narrow area surrounding the south and east sides of the Caspian, (secondly) valleys of the Helmand River and Lake Helmand in Sistan in southeast Iran and deserts extending thence across southern Afghanistan, and (thirdly) the vast Turkoman Plains, which touch northeastern Iran and include a large part of northern Afghanistan. (Through the north-central part of both countries extends a great mountain system known as the Elburz in Iran and the Paropamisus, Kuh-i-Baba and Hindu Kush in Afghanistan, but having numerous *en echelon* outlying ranges.

Great Deserts in Central Part

The usual altitude of the great central Plateaux is from 3,000 to 6,000 feet, but a few intermediate areas descend considerably lower, and the plateaux are intersected by mountain ranges. Great deserts also occupy the great central areas, conspicuously the Dasht-i-Kavir and Dasht-i-Lut in east central Iran, and the great sandy desert of southern Afghanistan. The largest rivers do not enter the ocean but enter the central depressions—the Gaud-i-Zirrah in the Sistan lowlands, and the vast areas of the Turkoman Plains. The climate of these plateaux is notoriously arid, and it has been so for thousands of years—water is hard to find in many areas.

Investigation and correlation of results of work in such a vast and varied area call for a great amount of traveling, and the journeys and work of the writer took him from Teheran east to central Badakshan and the frontiers of India, and from the Caspian Sea, Turkoman Plains and Oxus River south, nearly to the Indian Ocean. The greater part of this traveling could be done by automobile but numerous traverses were on foot. Since the objective was geologic a vast amount of data were collected.

Sediments Very Thick.

Geological formations range from Cambrian to Recent and structural types are many. Sediments may have a total thickness of 20,000 feet in places and sometimes the Cretaceous alone is over 10,000 feet, with Eocene and Oligocene similarly thick elsewhere in other sections. Some of the scientific results, aside from those of a strictly commercial nature, are the following:

1. Establishment of the coextensiveness of the cores of the Elburz and Hindu-Kush Mountains, as already explained.

2. Discovery that the northern frontal ranges, between this axis and the Turkoman Plains, in both Iran and Afghanistan, consist of *en echelon* arrangements of folds and thrusts.

3. Proof that the Caspian Sea, Seistan depression and certain other basins are the result of block

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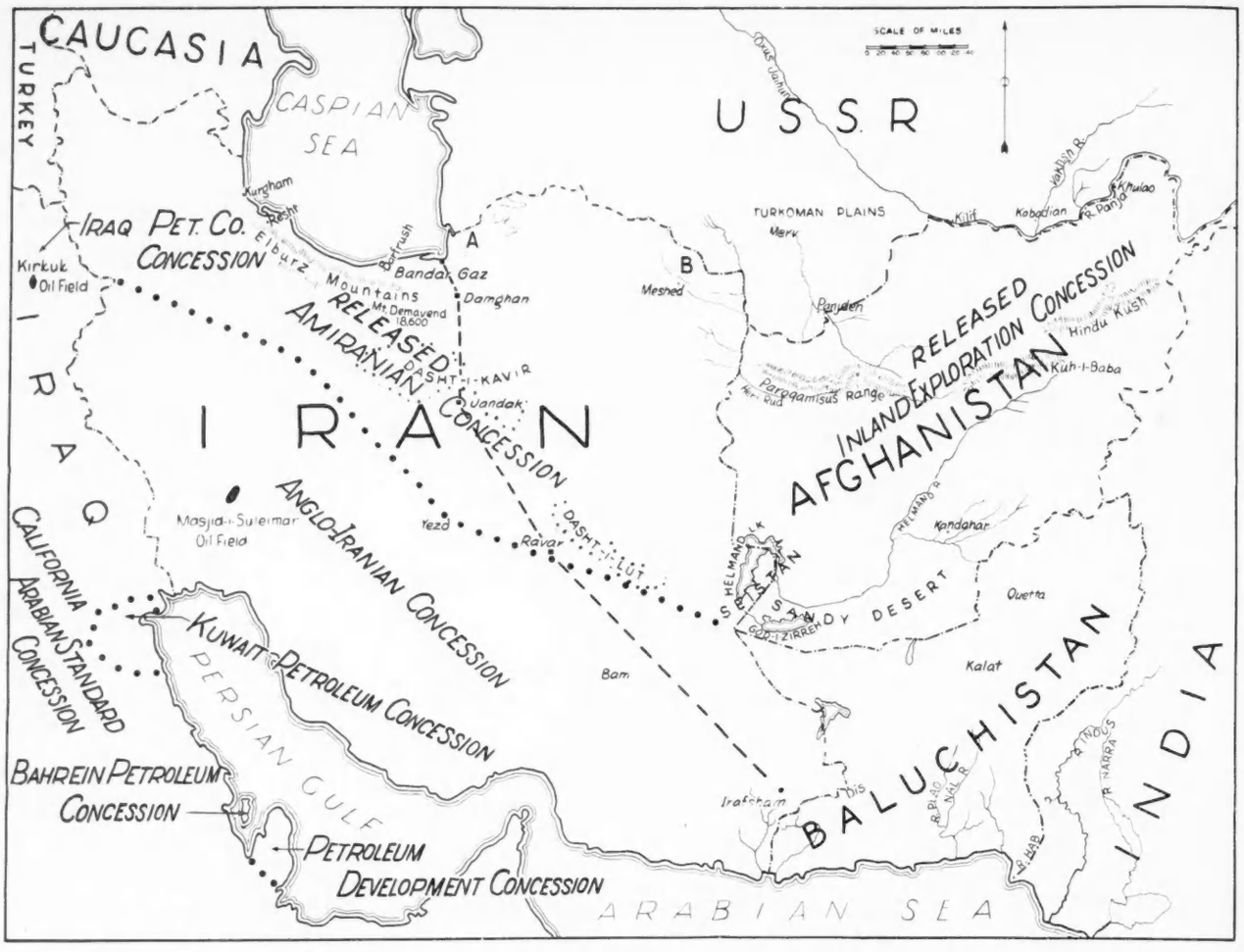

Area to right of line of dashes roughly represents that covered by parties working for Inland Exploration Company and Amiranian Oil Company in Afghanistan and Iran. Sketch map not furnished by author.

faulting, relatively downward toward the center of the Caspian Sea, Helmand Basin, etc.

4. Proof of a probably late Paleozoic sedimentary deposition throughout most of eastern Iran; the subsequent elevation of parts of this area into extensive lands.

5. Evidence of the widespread, although not continuous, extent of Mesozoic deposition of one epoch or another over eastern Iran, although transgression during Cretaceous time undoubtedly took place following a period of great erosion in the Upper Jurassic and Early Cretaceous.

6. The coextensive nature of the marine Eocene facies of northern India through Baluchistan and eastern Iran at least as far as north-central Iran.

7. Mapping of a vast sedimentary and intrusive basic volcanic area which is mainly of early Tertiary age, extending from near Meched on the northeast to central Iran on the southwest, reaching northwest into Turkey and southeast to India. The volcanoes of the area, although they must have been numerous in early Tertiary time, died out in late Tertiary times.

8. A considered conclusion that the so-called "green series" of tuffs and interbedded lavas, of the southern flank of the Elburz and far-flung to the southeast, commenced in Eocene time and extended into the Oligocene, although rocks which are often correlated with this series may be more varied than this.

9. The collection, on the part of a dozen investigators, of large numbers of fossils, of ages from Devonian to Recent, in almost all areas east of central Iran. The filing of these in two places: (a) The Museum of Leland Stanford University at Palo Alto, California, and (b) in Teheran. They are available for scholars working on similar problems. The determination of the identity and ages of numerous species, especially those of Tertiary age, by Dr. Hubert G. Schenck, and the submission of others to competent authorities for determination.

10. The impression that the aridity of the Iranian plateau is not a recent phenomenon historically. It seems probable that desiccation was already far advanced at the time of the march of Alexander the Great to India, if not during Iran's mythological period. In all probability the late Pleistocene was a time of average climate.

Although most of the results mentioned are based on work of the past year, some of them date from previous years of the writer's travels in the countries mentioned. Certain results will be amplified later.

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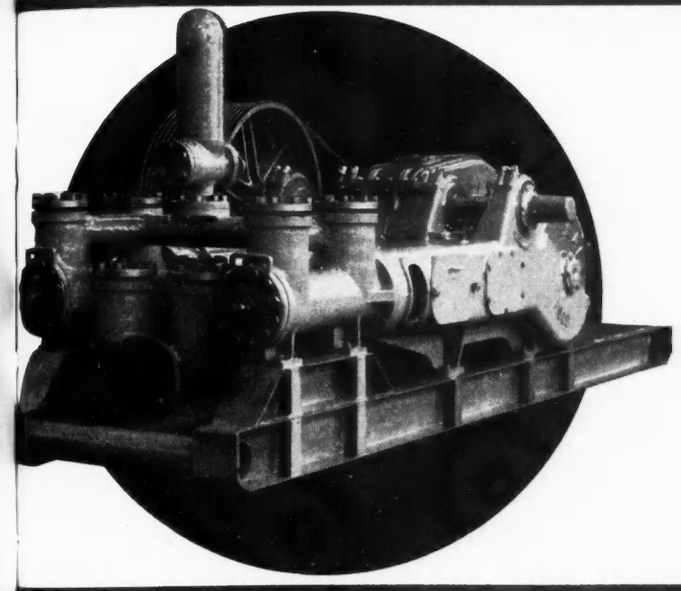
No. HS-20½ ROTARY MACHINE

A heavy duty unit developed from years of rotary manufacture and field research. It is designed for all deep drilling requirements up to 15,000 feet, with unusual flexibility in rotating speeds. Spiral bevel gears provide smooth, quiet running; pinion shaft of heat-treated alloy steel forging; heavy duty ball bearings and oil bath lubrication are features that assure safe and efficient operation under the most severe drilling conditions. Gross weight, prepared for Export, 11270 pounds.

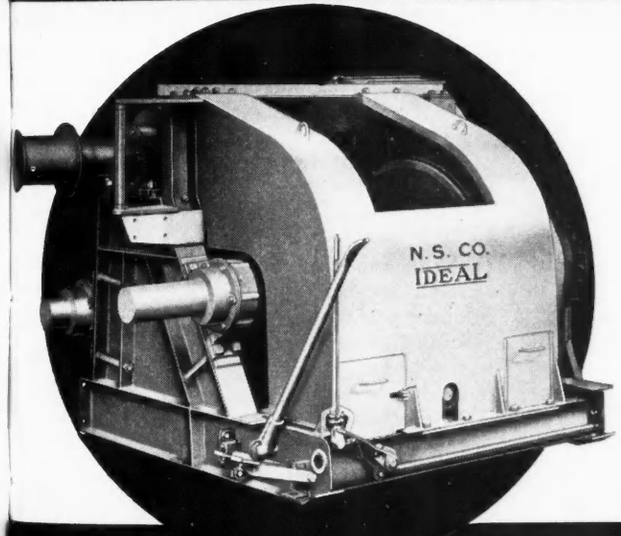
The FE-17½ Rotary Machine is a fully enclosed, oil bath unit for moderate depth drilling. The latest National features, together with many improvements not available in other rotary machines, assure quiet, dependable operation. Gross weight, prepared for Export, 7773 pounds.



POWER DRIVEN SLUSH PUMPS

These pumps are made in a complete line of five sizes for varied horsepower and working pressure demands. All are ruggedly constructed to meet the severe requirements of modern drilling methods. The wide face helical gear drive is a heat-treated steel casting and is completely enclosed. Pinion shaft and crank shaft are forged from alloy steel, heat-treated and ground for maximum strength and wear. The relatively large diameter shafts and large capacity bearings reduce deflection to a minimum and insure correct alignment of gears under load. Lubrication is positive and automatic. The fluid end is highly efficient, with unusually large fluid passages and closely spaced suction valves. These Pumps are available in the following sizes:

	Working Pressure	Gross Weight
C-350, 7¾"x18", 350 H.P.	3000 lbs.	39000 lbs.
C-250, 7¼"x15", 250 H.P.	2500 lbs.	31000 lbs.
C-150, 6¾"x12", 150 H.P.	2000 lbs.	17900 lbs.
C-100, 6¼"x10", 100 H.P.	1500 lbs.	12500 lbs.
D- 50, 5" x10", 50 H.P.	1000 lbs.	6200 lbs.



No. 34-2R-FE DRAW WORKS

A 3-shaft, 4-speed unit for medium depth drilling, designed especially for use in oil fields outside the United States. Being easily transported and adaptable for driving with any prime mover, it is particularly suitable for exploration work. Furnished either fully enclosed or semi-enclosed, and with either short or extended skids. The large brake rims, close bearing centers, heat-treated shafts, and heavy duty self-aligning roller bearings indicate the unusual strength which has been built into this compact, light weight unit. Outstanding features include: Sprockets with machine cut teeth and hardened driving faces; chains constantly sprayed with oil; positive lubrication to rotary drive sprocket teeth; two-speed rotary drive from the drum shaft; Ideal compound equalizing brakes; four-jaw clutches on the drum shaft; provision for Hydromatic Brake. Gross weight, prepared for export, 18000 pounds.

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Petroleum Engineering in Foreign Fields

Solutions of field problems abroad are discussed in papers presented at annual meeting of American Institute of Mining and Metallurgical Engineers.

Problems of widely varying nature are encountered by the petroleum engineers and other technologists of the oil industry in the world-wide search for and development of oil fields.

This fact was reflected in the group of papers dealing with petroleum engineering in foreign fields, presented at the annual meeting of the American Institute of Mining and Metallurgical Engineers at New York in the February 14 sessions.

Two of the five papers in that group described the solutions of special problems encountered in Iran. H. S. Gibson, of Anglo-Iranian Oil Company, discussed in detail the unusual, highly efficient process used in the Haft Kel field for recovery of casinghead gasoline, the process being known there as multistage stabilization. Through the process, dissolved gases are released or separated from crude in several stages, and casinghead gasoline is recovered as a separate liquid in each stage. Subsequently, that casinghead gasoline is blended with crude for transportation through the pipe line serving the area.

A paper by M. W. Strong, chief resident geologist of Anglo-Iranian Oil Company, at Masjid-i-Sulaiman, Iran, discussed comprehensively the technique of handling drilling muds in Iran. The paper dealt with the various mud problems encountered in that country, some of which were peculiar to the area.

Bahrein Island was the setting for a paper on air conditioning as applied to oil field buildings in tropical climates, by O. W. Johnson, of Standard Oil Company of California and T. A. Pollard, of Bahrein Petroleum Company, Limited. The authors described the problems that were faced in planning and installing air-conditioned residences and working quarters for the Caucasian families and employees who went to Bahrein Island in the oil field development there.

The thorough paper on the Turner Valley field, Canada, by Vernon Taylor, of Imperial Oil, Limited, brought out evidence that the area has been established definitely as a major oil field. The suggestion was offered, moreover, that other important fields may be found in the region, which has been explored by the drill only to a limited extent so far.

J. E. Brantly, Drilling & Exploration Company, Incorporated, was the author of an interesting paper that explained how numerous difficulties and handicaps were overcome in the drilling of a wildcat in Eastern Peru, at the headwaters of the Amazon River in South America.

Abstracts of these papers follow:

Multistage Stabilization of Crude Oil

By H. S. GIBSON
Anglo-Iranian Oil Company, Ltd.

A process known locally as multistage stabilization has been used nine years in the Haft Kel field of Anglo-Iranian Oil Company in Southwest Iran for recovery of casinghead gasoline, and 200,000,000 barrels of crude have been thereby handled. The process consists in releasing dissolved gases from crude by stages, and it prevents butanes and pentanes from leaving the crude instead of allowing them to be vaporized and then recovered from the lighter gases by the usual compression or absorption process. Gas is separated from the oil in several stages, in each of which the oil and gas are in equilibrium.

Casinghead gasoline recovered as a separate liquid in the Iranian fields, is blended with the crude, as the crude oil pipe line offers the cheapest means of transportation.

The one essential for efficient multistage stabilization is that flowing pressures of wells should be relatively high.

It was indicated that six stages operating between a flowhead pressure of 500 pounds and a final pressure of 10 pounds per square inch gauge would give a good efficiency of gasoline retention and that the operating pressures should be such that equal volumes of gas, measured at their respective pressures of separation, should be removed from each stage.

Although the multistage stabilization process has been used so far only at Haft Kel, a unit with 150,000 barrels a day capacity is now being installed in the new field of Gach Saran.

The first stage of separation at Haft Kel is carried out in separators as near as possible to the well heads in order to obtain the highest possible pressure. The flowing pressures of the wells range largely between 500 and 600 pounds gauge, at a constant temperature of 105 degrees Fahrenheit. At the standard temperature of 80 degrees Fahrenheit, the operating pressures of the five subsequent stages of separation are 218, 102, 55, 34, and 25 pounds per square inch absolute, although temperature of the oil varies over summer and winter from 140 to 40 degrees Fahrenheit.

The efficiencies of the Haft Kel processing method compare most favorably with those obtainable by the best absorption plant, especially when time efficiency is considered. Maintenance work on the separators is practically nil.

Multistage stabilization at Haft

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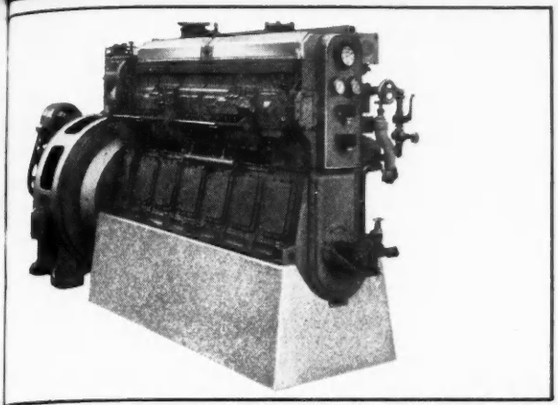
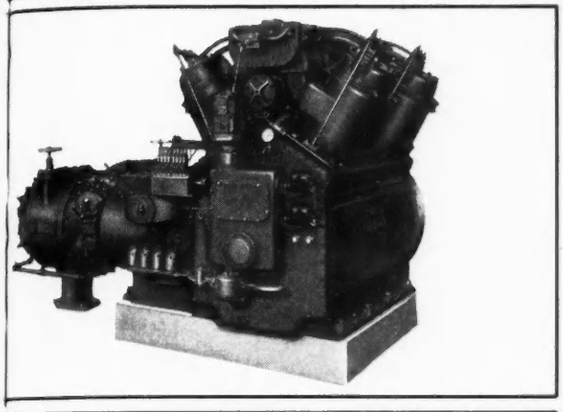


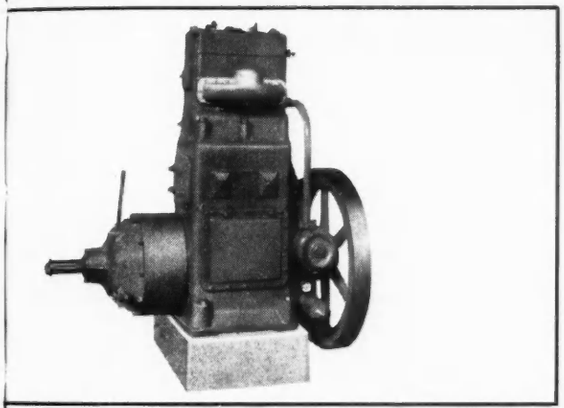
TYPES EN and GN

Proven in every type of service! Four-cycle, vertical gas or Diesel engines, and convertible. Type EN built in 6 and 8 cylinder units . . . 150 to 280 hp. Type GN built in 3, 4, 6 and 8 cylinder units . . . 135 to 480 hp.



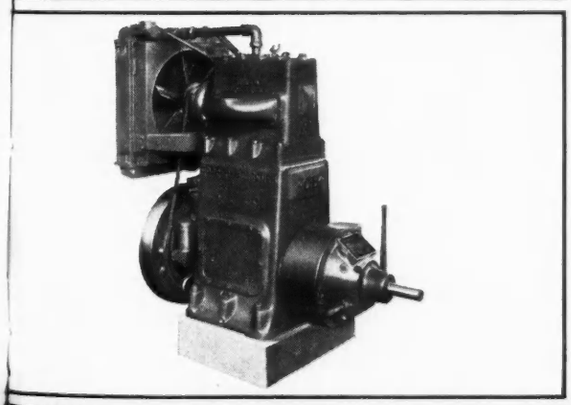
TYPE G-MV Compressor

Two-cycle, gas-engine-driven compressor unit, with V-type power cylinders and horizontal compressor cylinders. Compact and powerful. Shipped completely assembled except for attaching compressor cylinders. Built in 4, 6 and 8 cylinder units, rated 400, 600 and 800 hp.



TYPE G-SD

Two-cylinder, two-cycle, vertical pumping engine, rated 40 to 60 horsepower at 400 to 600 rpm. Furnished as a gas or semi-diesel unit. Full pressure lubricated and with tapered roller main bearings. Lightweight, yet built to outlast the field.



TYPE G-SC

Two-cylinder, two-cycle gas engine rated 25 to 35 hp at 600 to 800 rpm. Shipped completely assembled with radiator and fan as standard equipment. Full pressure lubricated, tapered roller main bearings, started either by hand or compressed air.

DRILLING, PUMPING, COMPRESSING . . . THERE'S A COOPER-BESSEMER GAS OR DIESEL ENGINE FOR THE JOB. THEY'RE RUGGED FOR HARD SERVICE . . . COMPACT FOR SAVINGS IN HOUSING AND FOUNDATION . . . EASILY TRANSPORTED AND INSTALLED . . . ECONOMICAL BOTH IN OPERATION AND MAINTENANCE. MANY OF THESE UNITS ARE CONVERTIBLE IN THE FIELD FROM ONE FUEL TO THE OTHER.

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Kel has helped considerably to simplify production operations. The output from the field is handled by three units, with capacities of 125,000, 65,000 and 40,000 barrels daily. These units serve groups of 4 to 10 wells, the output of each well being from 10,000 to 16,000 barrels daily. Each well is fitted with a separator. The other five stages of separation constitute the stabilizer unit and are located 1600 to 1900 feet above sea level, from which level they deliver crude by gravity flow to the first boosting station on the pipe line 60 miles away.

The distance between the well head separators and the stabilizer unit is in some cases as much as three miles, with a difference of elevation of 500 to 1200 feet, the wells being at the lower level. The outlet of the final separator is connected directly to the main pipe line leading to the refinery.

No tanks whatever are included in the production system. If there should be a break in the main pipe line, all producing wells can be closed in by closing a valve.

The whole installation has a low first cost, and operating maintenance costs are below those of an absorption plant handling an equivalent quantity of gas.

Mud Technique in Iran

By M. W. STRONG
Chief Resident Geologist, Anglo-Iranian Oil Company, Masjid-i-Sulaimah, Iran

This paper treats of the main mud problems encountered in Iran, some of which are peculiar to the local conditions, while others are of general nature common to all workers in this subject.

The technique of handling drilling muds varies somewhat, partly because of personal factors, but mainly because of differences in formation, the type of problems met with, and the general drilling conditions in different localities.

The great depths of today have necessitated closer attention to drilling mud technique.

In deep wells in Iran the normal overburden may consist of (1) Up to several thousand feet of marl with interbedded sandstones and limestones of varying porosity and permeability; (2) beneath this a chemical series of rock salt and anhydrites, containing marls and thin limestones, 10,000 to less than 300 feet thick; (3) underlying thick limestones with rare thin marl bands.

The top series (1) sometimes contains high pressure oil or gas shows in the sandstones, but more often only low pressure waters, and where both are present, difficulties ensue because the heavy muds tend to form rings on the low pressure sandstones.

In the second series (2) are waters high in magnesium chloride content and sometimes gas, and very heavy drilling muds are required. In this series difficulties also arise from extreme folding, faulting, and thrusting, which make the wall of the hole unstable.

In the salt series it is necessary to drill with saturated brines to avoid accentuating difficulties by leaching out salt and causing the marls to cave.

The lower series (3) of limestones is competent. The pressures may be 1,000 pounds or so below those of the chemical beds, and if the lower pressure conditions are penetrated while the mud pressures and gravity are for high-pressure conditions, the stage is set for a fishing job with frozen tools.

Within the limestones themselves, fissuring, fracturing, and permeable beds provide the main difficulties, and special methods have been developed to deal with them.

Essential information respecting mud operations in wells is entered daily on a graphic log.

The main mud problems faced in Iran are: (1) High pressure shows, necessitating very heavy muds; (2) porous or permeable formations, necessitating the use of bentonites to stop mud-ringing (3) caving formation, due either to tectonic causes, as in heavily fractured zones, to beds plastic under high rock pressure, or to beds taking up water from the mud and sloughing into the hole and (4) highly fissured formations, causing lost circulation and necessitating special temporary measures.

The pure mud problems which have to be solved in connection with these difficulties are: (1) the highest gravity in muds usable under given conditions; (2) the least permeable or non-mud-ringing muds available, fulfilling also other necessary requirements and (3) the most satisfactory setting or sealing mixtures.

The problem of loss or sealing off of production is being solved by either drilling in with water or by subsequent acid treatment if mud has been used. As the pay is in a limestone and the raw muds are high in lime content, this presents no great difficulty.

As a weighting material barite is used, mixed with a water-bentonite base.

To reduce mud-ringing and connected difficulties, muds must be as non-permeable as possible. Bentonite is used liberally and amply repays any expense on it. Even in brine mud conditions, bentonites still retain the property of non-permeability and lubrication.

Lost circulation is a fairly common problem in the fissured limestones. In normal conditions where the fissures are not large, an effective method is to pump down thick mud full of cuttings. In more stubborn cases, mud and cement mixtures are used, the mix being as thick as possible. In semi-cavernous conditions, use has been made of sand, cement, chopped rope, aquagel, and small desert bushes, mixed together on the derrick floor and made up by hand into thick plastic lumps, inserted by hand into the casing on top of a plug, and finally pumped to the spot in 100 cubic foot batches, leaving some in the hole and some in the cavern, with each batch allowed to set for 24 hours before drilling through.

Laboratory work is divided roughly into routine and research. The routine work comprises chemical and physical examination of all mud materials contemplated for use, such as commercial materials or materials quarried locally. The research work has less bearing on direct drilling requirements and deals more with fundamental problems, with a view to the general improvement of the muds in use, increasing the flexibility of control of special properties, and foreseeing and forestalling future problems and requirements.

Air Conditioning as Applied to Oil Field Buildings in Tropical Climates

By O. W. JOHNSON
Standard Oil Company of California, San Francisco, California; and
T. A. POLLARD
The Bahrein Petroleum Company, Limited, New York, New York

Air conditioning of dwellings and working places has proved economically sound where Caucasian employees are employed in tropical regions; and satisfactory equipment may be designed, based on principles tried and proven in the temperate region, provided care is exercised to discover and weigh all important contributing facts and conditions.

The problem and solution discussed in this paper was that of cooling and controlling air humidity in 15 detached buildings. It was de-

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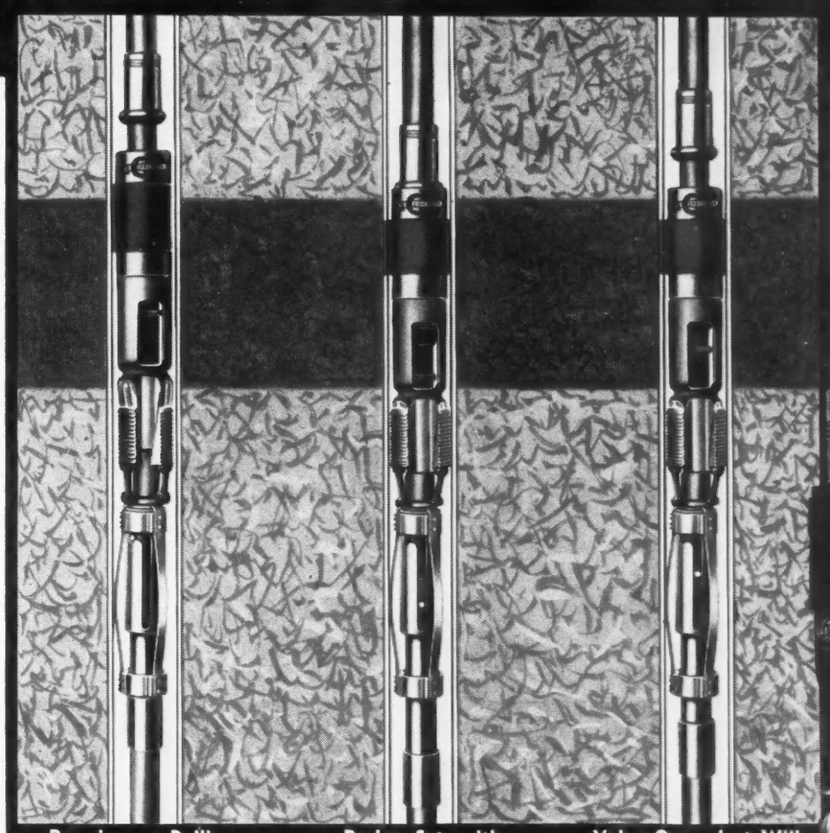

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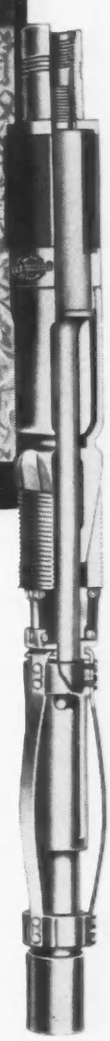

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cided that the most economical and satisfactory system would be to chill water at a central point and to circulate the chilled water to the various houses.

In the tropics, the extreme weather causes acute discomfort to most persons not native to the region, and some find it impossible to adjust their metabolism to maintain good health under these conditions. Artificial control of temperature and humidity indoors by air conditioning offers a solution.

Experience has shown that 82 degrees temperature and 60 percent relative humidity (the air holding 60 percent as much water as possible at that temperature) is not too high to afford relief in comparison with really severe outdoor conditions.

Economy suggests that a minimum of fresh air be supplied, since the incoming outside air adds to the air conditioning load, but air conditioning equipment may be designed to make it possible for occupants to cut down fresh air if they prefer greater temperature reduction at the expense of ventilation.

Heat that enters an air conditioned space comes from various sources and air conditioning equipment must be designed with due regard for these sources. Heat that leaks in through walls and ceilings can be controlled to some extent by a choice of suitable construction materials. Heat coming through windows as sunlight can be controlled by shading of porches or awnings. In general, a careful study of building design in its relation to air conditioning is desirable. This applies not only to materials of construction but also to size and arrangement of rooms and windows.

Based on a similar actual project carried out on Bahrein Island in the Persian Gulf, a discussion is herewith given of a typical problem of cooling a group of houses in a tropical oil field camp.

The problem presented was to provide air conditioning for 15 duplex cottages for married couples, each half of the house consisting of a three-room suite of living room, bed room and kitchen. The houses were to be spread out along the brow of a low hill, oriented in varying directions to conform to the topography, and with a minimum spacing of 50 feet. The houses were arranged roughly in two rows but occupied a comparatively large area. The spacing required special consideration in the design of the air conditioning equipment.

The floor plan took into consideration the air conditioning plans. It was decided to employ walls of native stone and flat roofs supported on wood joists. Floors were of concrete placed directly on an earth fill. Insulation of both walls and ceiling was considered warranted, and rockwool insulation was provided.

It was indicated that outdoor temperatures of 100 degrees or over would prevail practically every day in the worst season and that the moisture content would range around .021 pounds per pound of dry air—equivalent to 79 degrees dew point. This condition accordingly was chosen for an outdoor design condition. And for an indoor design condition, a preliminary figure of 85 degrees temperature and 50 percent relative humidity was chosen, corresponding to a dew point of 59 degrees (absolute humidity .011 pound).

The kitchens were not cooled, because occupied only a few hours daily in the hot weather and because stoves and refrigerators would have made cooling difficult.

In deciding on the general type of equipment to be used, various factors were considered. To provide simplicity and minimize maintenance, it was considered desirable to have a central refrigerating plant and to distribute "cooling" to the houses. Distribution of liquid refrigerants seemed undesirable, and chilled water of around 50 degrees temperature was selected. Pipes were not insulated but buried two feet.

A single cooling unit for each half of each house was chosen in preference to either one unit for the whole house or separate units for each room, so that each family could control its own unit and direct cooling into either room desired.

Electric power was available in sufficient amount and was chosen for operating the central plant. Water was not abundant enough to permit running condensing water to waste, and so a cooling tower was installed. Because of frequent periods of calm, a forced draught tower was used.

The central plant comprised two separate and independent refrigerating machines, each with its own water cooled condenser and water chilling evaporator, a cooling tower, and condensing water and chilled water circulating pumps. Hermetically sealed electrically driven compressors were chosen to minimize refrigerant leaks, and Freon was used as the refrigerant. The dual arrangement permits operating at part capacity in case one half of the plant should break down.

For air cooling units in each half of the house, a water coil unit with motor driven centrifugal blower was employed, delivering about 600 cubic feet of cooled air per minute. Filters were provided to remove dust and lint from the air before it was passed over the water chilling coil. The chilling unit was located in a small closet adjacent to the hall. A small fresh air inlet extending through the ceiling and above the roof provided for drawing in required fresh air. A grille in the closet door permitted room air to be dawn into the unit for recirculation. The cooled air was delivered through ducts enclosed above the hall ceiling to outlet grilles in the bed rooms and living rooms, where dampers were provied to permit altering the air distribution as desired.

On the basis of the computed cooling load, specifications for a cooling unit were prepared. Each unit was to consist of a water coil, centrifugal blower, drip pan, and filter holder, mounted in a substantial metal case, and arranged to deliver the cooled air vertically upward. The coil was supplied with chilled water at 52 degrees Fahrenheit and the air flow through the coil was downward to facilitate removal of condensed moisture.

To save expense and to avoid maintenance trouble, no automatic thermostatic controls were installed in the individual houses, although air quantity delivered to various rooms can be cut down by closing the registers. Similarly, distribution between rooms can be controlled.

Provision is needed for adequate fresh air, and a fresh air duct leading from the roof into the space occupied by the air conditioning unit was installed. Thus the fresh air is well distributed throughout the house, affording an advantage over the alternative method of allowing fresh air to enter through partially enclosed windows. Furthermore, under the plan adopted, the coil performs better in removal of moisture, improving the moisture balance of the whole system.

It was found desirable to employ air filters on the air intake of all units. The filters remove household dust and lint and much of the outside air-borne dust that enters the house and that otherwise would strike and cling to the wet surface of the cooling coil. If dirt accumulates on the coils, the passage of air is impeded and the capacity of the unit is reduced.

The total cost of the air conditioning equipment for the 3-room quarters above described, including overhead on labor and a prorata share of the cost of the chilled water distributing system, central plant, and

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the power plant required to furnish operating power is estimated around $900, exclusive of material and labor for insulating the house. However, it will frequently be feasible to supply smaller and less expensive quarters if they are made comfortable by air conditioning. And air conditioning makes unnecessary the excessively large rooms, high ceilings, wide hallways and porches, and other extravagances sometimes provided in an effort to offset uncomfortable weather conditions. The smaller, air conditioned building is possibly of smaller over-all cost, as well as more comfortable, than the described excessively large place.

In the Bahrein Island project, the first season's operation of circulating chilled water was free from serious trouble. This indicates the feasibility of applying the method to other installations. Sleeping conditions were generally conceded to be good, some occupants having actually used blankets at night.

While a part of the cost of air conditioning can be repaid in savings in the cost of buildings, which can be made smaller, further compensation is afforded in the intangible factors of increased employee efficiency, improved morale, better health, reduced hospitalization, and reduced labor turn-over.

Air conditioning may require an expenditure of the order of 10 to 20 percent of the cost of the structure involved. It is frequently possible to provide air conditioning in existing buildings, but the best overall economy and satisfaction will result when the buildings are designed and built with air conditioning in mind.

Development of the Turner Valley Gas and Oil Field, Alberta, Canada

By VERNON TAYLOR
Imperial Oil, Limited

Turner Valley field, Alberta, about 30 miles southwest of Calgary and 115 miles north of the United States border, produced 97 percent of all Canadian oil output in 1938, the yield having been 6,741,550 barrels, or 3,944,642 barrels more than in 1937. In the British Empire, Canada's production is comparable to that of Bahrein Island and Burma.

First production at Turner Valley was light oil produced in 1913 from Upper Cretaceous beds at 1557 and 2380 feet. In October, 1924, the discovery well of the Paleozoic limestone was completed at 3740 feet with initial flow of 600 barrels of 72 A.P.I. gravity naphtha and 20,000,000 cubic feet of gas per day. Subsequently, naphtha wells were completed also at greater depths. By the end of 1934 production had been obtained over an area 13½ miles long and 1 to 1¼ miles wide, with only the eastern boundary fairly definitely established. In June, 1936, the first large crude oil producer at Turner Valley was completed with initial production of 850 barrels of 44 gravity oil and 2,000,000 feet of gas daily, the top of limestone having been encountered at 6396 feet or 2155 feet below sea level. The well demonstrated the existence of crude oil production along the west flank of the structure. Subsequently an active drilling campaign has been carried on.

The structure is a highly faulted, closely folded anticline, about 20 miles from the front range of the Rocky Mountains. Eastward the beds dip into the Alberta syncline. The structure is underlain by a major over-thrust fault. The eastern edge of the productive limestone is sharply defined by this fault. The north and south limits of the field have not yet been ascertained, and the total length of the productive area so far is merely 18 miles. Water on the west flank is an ineffective drive and the field is a gas drive area.

Formations contain good markers, and very little coring has been done.

The productive part of the structure has a closure of at least 3100 feet, the gas cap occupying 1100 feet at the top.

A well completed in January, 1939, at 8495 feet, in the north end of the field, was the deepest producer at Turner Valley up to that time.

At the end of 1938, 65 crude oil wells had been completed in the field. And there were 17 active drilling wells, all in the south end except one in the extreme north end, and 11 wells were preparing to drill or were temporarily shut down. (A crude well is defined by the conservation board as one with a gas/oil ratio less than 31,000 cubic feet per barrel.)

In early development, all drilling was done with cable tools. In the boom of 1929-1930 the use of rotary equipment sharply increased, and about 50 percent of the wells were drilled with rotary tools. In the recent crude oil development, rotary equipment has almost entirely displaced cable tools.

Difficult drilling conditions make drilling progress relatively slow, although completion time has been materially reduced in the past two years, in consequence of improved drilling equipment and technique, straight hole drilling, and control of drilling mud.

Heavy rotary drilling equipment is fairly well standardized in the field. Rock bits are now used entirely.

In the past two years, most of the gas from the gas cap wells has been processed in gasoline plants.

At the end of 1938, all wells were still flowing naturally and were mainly produced through 2½-inch and 3-inch tubing. Most wells are flowed continuously at low rates for production of their allowables. Under proration in November, 1938, the daily average production from the 65 producing crude wells was 12,850 barrels, with an average gas/oil ratio of 3450 cubic feet per barrel.

Under conservation regulations, wells are limited to 40-acre spacing, under the assumption such spacing should result in adequate drainage. The gravity of the oil ranges from 40 to 50 degrees A.P.I., depending on position on structure. The prevailing pipe line price for the oil ranges from $1.14 a barrel for 40 gravity upward 2 cents a barrel for each degree to 65 degrees.

All wells in the crude area are acidized.

The present available market for Turner Valley oil supplies the provinces of Alberta and Saskatchewan and parts of Manitoba and British Columbia. The crude oil requirements of this section may average about 16,000 barrels per day for the year as a whole, although demand varies with the seasons.

Original reserves in the gas cap area were about 1,300,000,000,000 cubic feet, and about 350,000,000,000 cubic feet remain now in the gas cap.

The oil area now has a total proven area of about 3743 acres, of which 3501 acres are in the south end and 242 acres are in the north end. Between the two areas is the large amount of prospective oil acreage.

An average of estimates by six petroleum engineers indicates that the probable area of the field is 15,275 acres and that possible oil reserves amount to 150,000,000 barrels, or approximately 10,000 barrels per acre.

Development of the Turner Valley field gives promise that additional important fields may be found in Alberta. Several small fields so far of minor importance have been discovered through wildcatting of the past 10 years, but a large part of the country has not yet been tested.

Prospecting for Oil at the Headwaters of the Amazon

By J. E. BRANTLY
President, Drilling & Exploration Company, Inc., Los Angeles, California

The Aguas Calientes Well No. 1, with which this paper is concerned, is in the Department of Loreto in Eastern Peru, about 3 kilometers north of the mouth of Aguas Cal-

"Notwithstanding all the difficulties he encountered, he went on. If there was reproach, he bore it. If poverty, he suffered under it. But he went on, and people then saw, when his invention was completed, that what they had been treating with ridicule, was sublime; that what they had made the subject of reproach, was the exercise of great inventive genius; that what they had laughed at, the perseverance of a man of talent with great perceptive faculties, with indomitable perseverance and intellect, had brought out as much to their astonishment, as if another sun had risen in the hemisphere above. . .

"I believe that the man who sits at this table. Charles Goodyear, is to go down to posterity in the history of the arts in this country, in that great class of inventors, at the head of which stands Robert Fulton . . . in which class stand the names of Whitney, and of Morris, and in which class will stand 'non post longo intervallo' the humble name of Charles Goodyear."

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◆ ◆ ◆

● This year marks the One Hundredth Anniversary of Charles Goodyear's discovery of vulcanization. In recognition not alone of his great contribution to the world but also of the self-sacrifice, the faith and courage of the man, this tribute is published by an enterprise founded long after his death — a business that, inspired by his example, seeks by serviceability to deserve his name. Dedicated to that service today is the G.T.M.—Goodyear Technical Man—who in countless new industries of which Charles Goodyear never dreamed carries on his work of multiplying rubber's usefulness through specialized application to industrial needs.

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ientes Creek. This small stream empties into the Rio Pachitea about 30 kilometers upstream from the latter's mouth in the Rio Ucayali. The road from the Pachitea to the well location winds through 10 kilometers of jungle forests and precipitous hills to span the 3 kilometer straight distance.

Nine hundred kilometers below the Pachitea the Ucayali joins the Maranon to form the Solimoes, which in turn joins the Rio Negro from the Guayana and Northern Brazil to form the Amazon. The entire distance from the river port nearest the well location down river to the Atlantic is somewhat less than 5,000 kilometers. Nevertheless, the Pachitea itself at Aguas Calientes is approximately the size of the Ohio river at Louisville. The air line distance to Lima, across the Andes and on the Pacific, is about 400 kilometers.

The nearest oil production is in the Talara field, northwest Peru, about 800 kilometers away, although the two areas are entirely unrelated geologically. Producing areas in Bolivia and western Argentina to the south and in eastern Venezuela to the north and east, involve formations deposited along the shores of the Brazilian landshield and are in the same great elongated synclinorium that lies between the Archaen crystallines of the old land area and the great Andes Mountain System uplift.

Transportation to the location required erection of unloading cranes at the river port and building of a road thence to the location. Satisfactory water for all purposes was abundant.

Steam driven equipment, of the least complicated type, and using wood for fuel, was selected as most adaptable to the isolated and remote location. It was decided to use a pump capable of delivering 250 hydraulic horsepower at 250 pounds boiler steam pressure and a 570 horsepower steam engine, and the rest of the rig and supplies were balanced around these two fundamental pieces of machinery.

Consideration of the geologists' estimates of formations to be encountered and their thicknesses led to the conclusion that a big hole and large casing would be too expensive and that the "slim" holes might not provide for fully testing the wildcat. Consequently, the casing program provided for a medium sized surface hole using 11¾-inch outside diameter casing; a water or oil string of 7⅝-inch casing; and a string of 3½-inch outside diameter internal flush joint drill pipe, to be used for drilling out plugs and through the inside of the 7⅝-inch casing and also to be used as tubing.

The steam power plant consisted of four 125 horsepower 250 pound steam boilers with a boiler feed water unit of two 6-4-6 boiler feed pumps and two 3-kilowatt generators. Ten thousand fire brick, including regular and arch forms, and two tons of fire clay were included. The boilers were set 42 inches off the ground, and a concrete wall 12 inches high and 6 inches thick was poured beneath the side and front water legs and extended 48 inches beyond the rear water leg or fire box door. An ash and draft opening was built in the end and grate bar rests were hung from the top of the concrete wall. A fire brick wall was then built beneath the boiler from the concrete up to and on the fire box side of the mud rim, and a wall together with an arch over the concrete wall section was erected behind the boiler. Iron door frames had been cast and shipped down for the fuel doors. A palm wood wall then was built around the entire group of four fire boxes, except at the fuel door or rear ends, and all of the space between this form and the brick work between the fire boxes was filled with well tamped soil. The arches were also covered in this same manner. The wood was cut in four foot lengths to be fed into the outer door of the oven and thence a part pushed back under the boiler.

With three boilers on the line, the plant was capable of delivering 125 hydraulic horsepower through the pump and about 100 horsepower through the engine, totaling some 300 horsepower. Thus they were operating at approximately 80 percent of rated capacity, whereas they would have delivered 150 to 200 percent using natural gas or oil as fuel. No blowers were used, and surprisingly high efficiency from the wood fuel was indicated. Sufficient wood for the whole drilling job was available within a short radius. Fuel consumption averaged 6 to 8 cords per boiler day.

Circulating pumps were 14-7¼-18 in size, including one for mixing mud and general service and one for drilling, although each could be used for either purpose. They were connected in series for compounding the fluid discharged and thereby increasing the pressure should it become necessary.

Two 11 x 11 semi-oil bath, slide valve, babbitt bearing steam engines were chosen to power the rig. One was placed to operate a 7-inch drum shaft drawworks and the other to power a sandreel to be used for wire line coring, swabbing, or bailing. These two engines, being identical, were interchangeable either entirely or in part.

Derrick tools consisted of a crown block, traveling block and hook each of 100 tons capacity and a 1-inch steel center regular lay wire line. Customary drill pipe tools were used. These all hung in a 537,000 pound capacity galvanized steel derrick 122 feet high and having a 24 foot base. The derrick was mounted on four steel pyramid corners with native handhewn hardwood beams and posts for table and pipe rack supports. The engine substructure was built of local timber.

The drilling shaft consisted of a full string of 5-9/16 inch drill pipe, 2000 feet of 4½-inch drill pipe for coring and ratholing and a full string of 3½-inch internal flush drill pipe. A full 90 foot stand of drill collar in 30 foot sections was provided for each drill pipe size. The depth capacity of the rig and drill pipe was 6000 feet, with the largest size and an additional 2000 feet with 4½-inch, or a total of 8000 feet of hole depth. Two kelly sizes were made available, 5-inch and 4-inch.

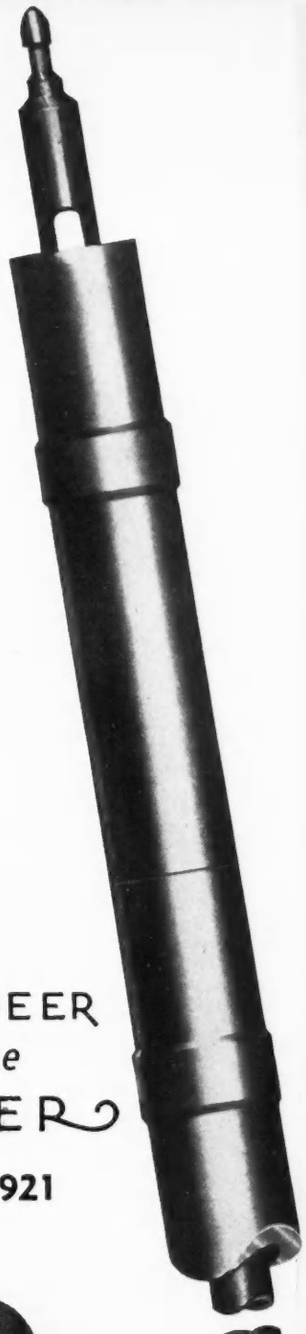
Drilling tools and coring equipment were supplied to accommodate the formations expected from the geological information given.

All supplies, replacements, and repair parts were furnished in sufficient quantities to drill the well as originally estimated, bearing in mind that the location was three months from the nearest source of supplies.

A 40 horsepower locomotive type steam boiler and a 10-4½-10 pump with 3-inch and 2-inch line pipe were provided for the water supply system.

In addition to the various items needed for actual drilling, there was also required transportation equipment consisting of two tractors with wagons and a road grading blade and two trucks, with sufficient Diesel and gasoline fuels and lubricants for five months' service. A motor boat and several outboard motors to power native canoes were provided for communication with the outside world. Hand and power tools for cutting fuel wood were needed, as were various building materials and supplies for camp and warehouse construction. One hundred tons of cement in air tight containers was needed for construction work and for cementing casing.

A three months' supply of foodstuffs was included in the original shipment with succeeding monthly orders.



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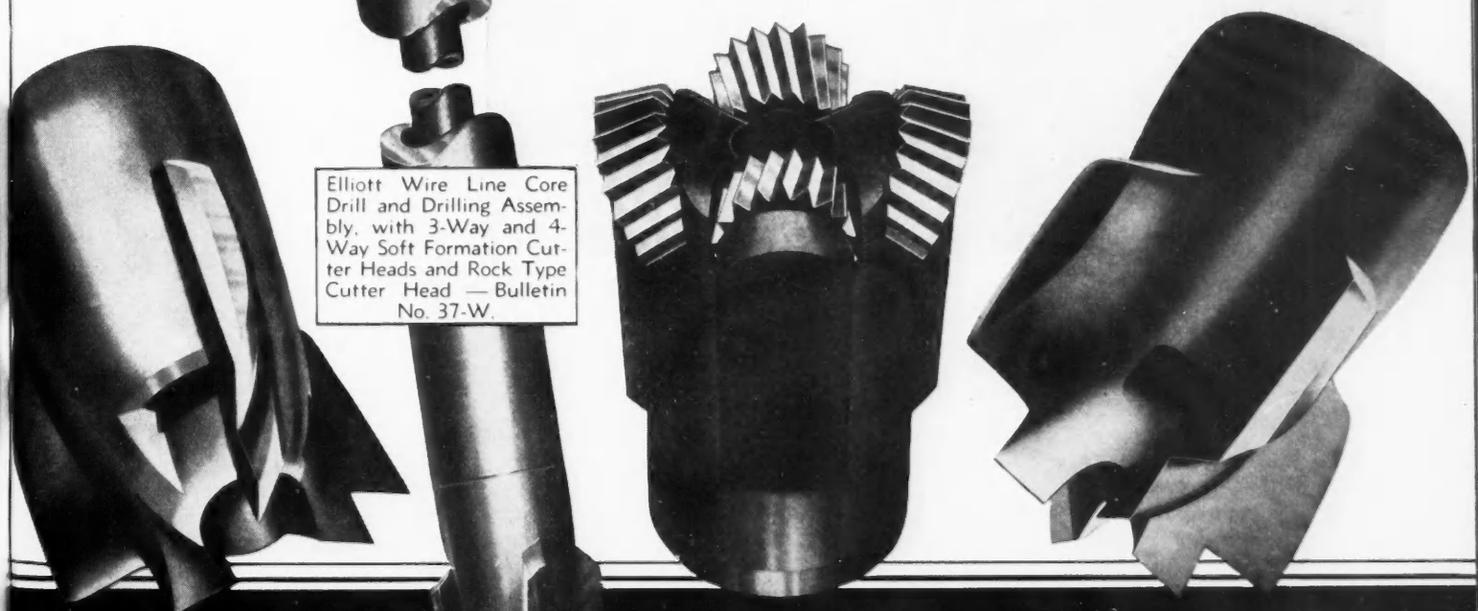

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CABLE TOOL -- ROTARY -- WIRE LINE CORE DRILLS

About 45 percent of Pechelbronn oil is recovered by mining. This picture of the Le Bel mine, which is equipped with two air intake and five air outlet shafts, shows a typical plant.

Formation Identification Big Problem in Pechelbronn

Percussion tools preferred above 1300 feet but rotary used for greater depths; sampling and electric logging used in conjunction

By YVAN MICHEL, Mining Engineer
Pechelbronn Oil Company

THERE are many descriptions of Pechelbronn oil field; we shall be satisfied to recapitulate only its main characteristics.

The structure is lenticular with a great number of faults; the productive horizons have no great thicknesses; the pressure is low. The most prolific horizons are in the Oligocene at a depth rarely exceeding 700 meters (about 2300 feet). Some sands are also found lower in the Jurassic (Oolith) and the Trias (Keuper). These conditions have led to employment of methods for recovery of the greatest possible part of the oil, and for improved identification of the formations.

About 45 percent of Pechelbronn oil has to be recovered by mining. This method of producing will continue at Pechelbronn as long as the exploitation is restrained to strata not exceeding 500 meters (about 1500-1700 feet).

Identifications of Formations

In the early days of exclusive percussion and flush drilling, the oil horizons at Pechelbronn were identi-

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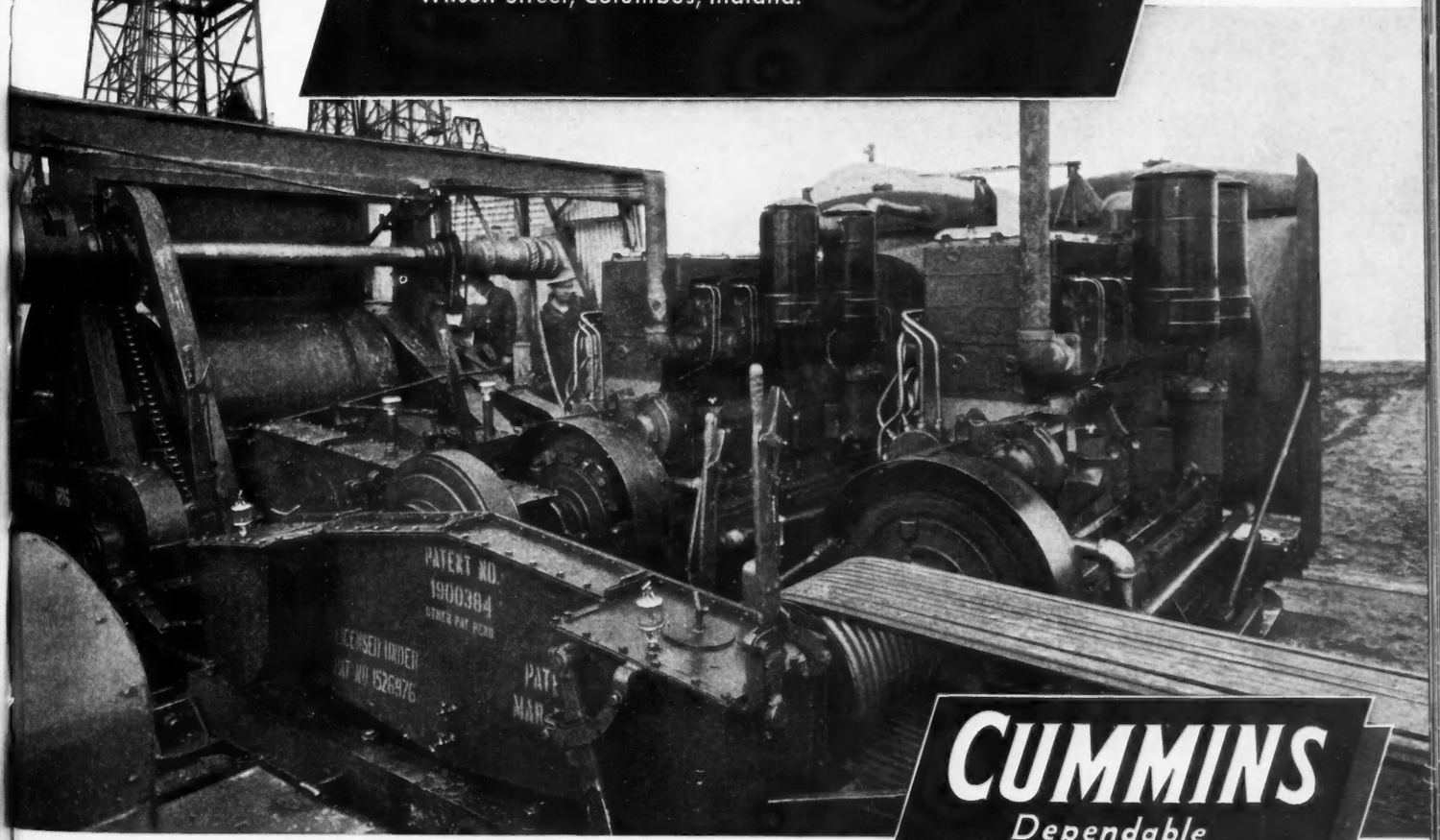

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This is a typical portable cable tool rig used to develop the upper sands in Pechelbronn.

fied by bailing at the presumed productive points. This, while giving valuable information about the productiveness of the horizons drilled through it, did not give precise measurement of their real location. It required a previous shutting off of every water sand. The main formations were recognized by coring.

The introduction of cable tools (1925) brought a great improvement; but their use is handicapped because Pechelbronn oil field contains many water bearing strata, which calls for many strings of casing and makes drilling in some regions slow and expensive.

A fundamental advance was realized by the adoption of continuous sampling (1931). The methodic examination of the cuttings brought up by the circulating fluid has permitted identification of the strata nearly every foot of the way. Nevertheless, only the bailing test still permits an accurate idea of richness of producing strata. The examination of samples made at the well by the geological department is completed by laboratory determinations, especially with the method of ultra-violet (Wood) light.

In the meantime, the electrical logging and the other dependable proceedings have been developed. A crew of electrical loggers has operated permanently at Pechelbronn since 1928. It is engaged in logging for determining oil and water bearing sands, thermometric measuring, side testing (wall sampling), gun perforating and teleclinometer surveys.

Reverse Circulation

The circulating of mud laden fluid is direct for the barren formations and reverse when approaching the producing zone; this reverse fluid circulating, which is suitable also to the rock-bit, gives better samples than the direct circulating, and is much more esteemed by us because the cutting removal is greater and faster. Actually, the two proceedings, continuous sampling with cuttings and electrical logging, are used together.

Cuttings are separated from the mud by means of a rotating screen.

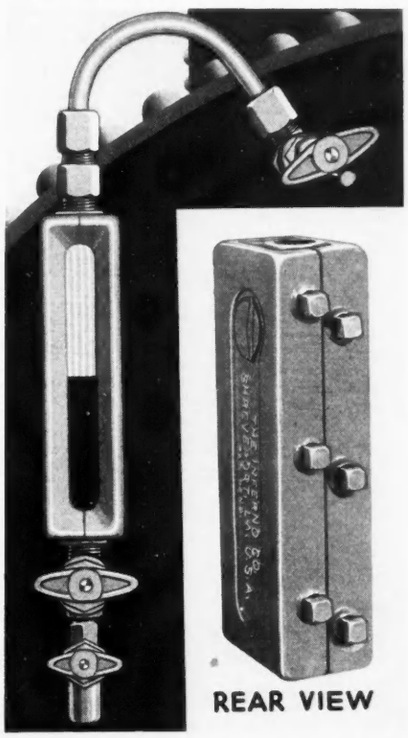
Drilling Practice

(a) **The Tools.** Our relatively poor production does not justify high exploitation drilling costs. The percussion system with drill-pipe or cable remains more economical for our hard barren formations. But below 400 meters (about 1300 feet), when the efficiency of flush percussion decreases, or in the water bearing regions, where the cable system necessitates many water shut-offs, it is economical to use the rotary, employing the rock-bit with 2-inch drill stems and a light rotary table. In this way we reach easily 3300-4000 feet. This simple change of the cutting tool, without any other modification of the rig, has considerably extended the sphere of economical action of our ancient rigs.

Rotary Purchased

But the necessity of deep exploration drilling led to purchase in 1936 of a heavy rotary rig, which recently reached the granite at 5120 feet at Kutzenhausen. Another rotary rig is now being purchased and will work on the Mont de Musiege near Frangy (Haute-Savoie).

PATENTED AND PATENTS PENDING



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ABOVE: The INFERNO "Clamp Type" Reflex Gauges which pay for themselves in a short time by eliminating glass breakage. Standard pipe connections—you can use your old fittings.

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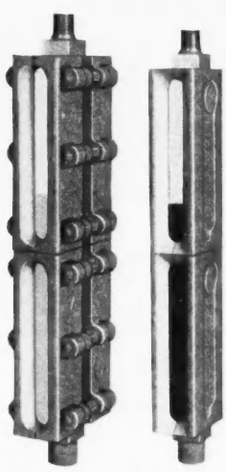

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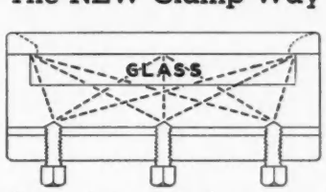
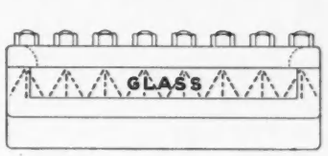


Clamps designed so that pressure from any one screw is distributed over the entire area of the glass.

The OLD Bolted Way



Force generated by bolts is localized, often resulting in glass breakage.

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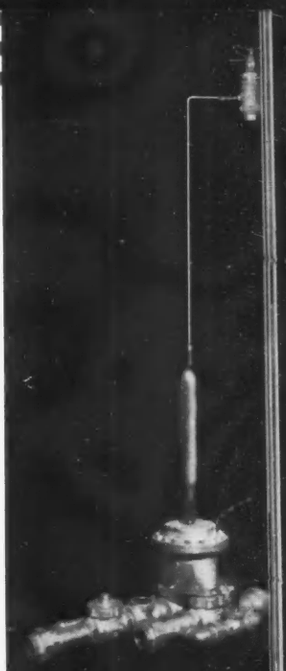

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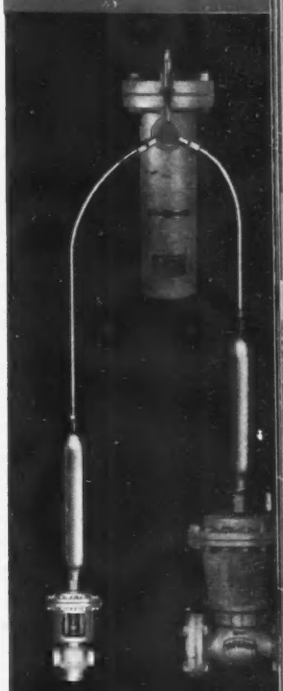
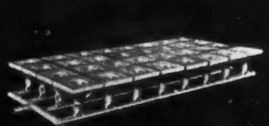
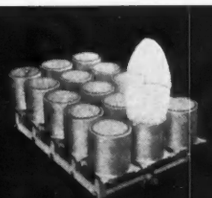


INFERNO LOWATER ALARM and FUEL CUT-OFF VALVE with FEED WATER CONTROL
Bulletin No. 15

INFERNO OIL BURNER
Bulletin No. 12

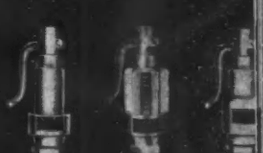


INFERNO SPECIAL TYPE GAS BURNER
Bulletin No. 14

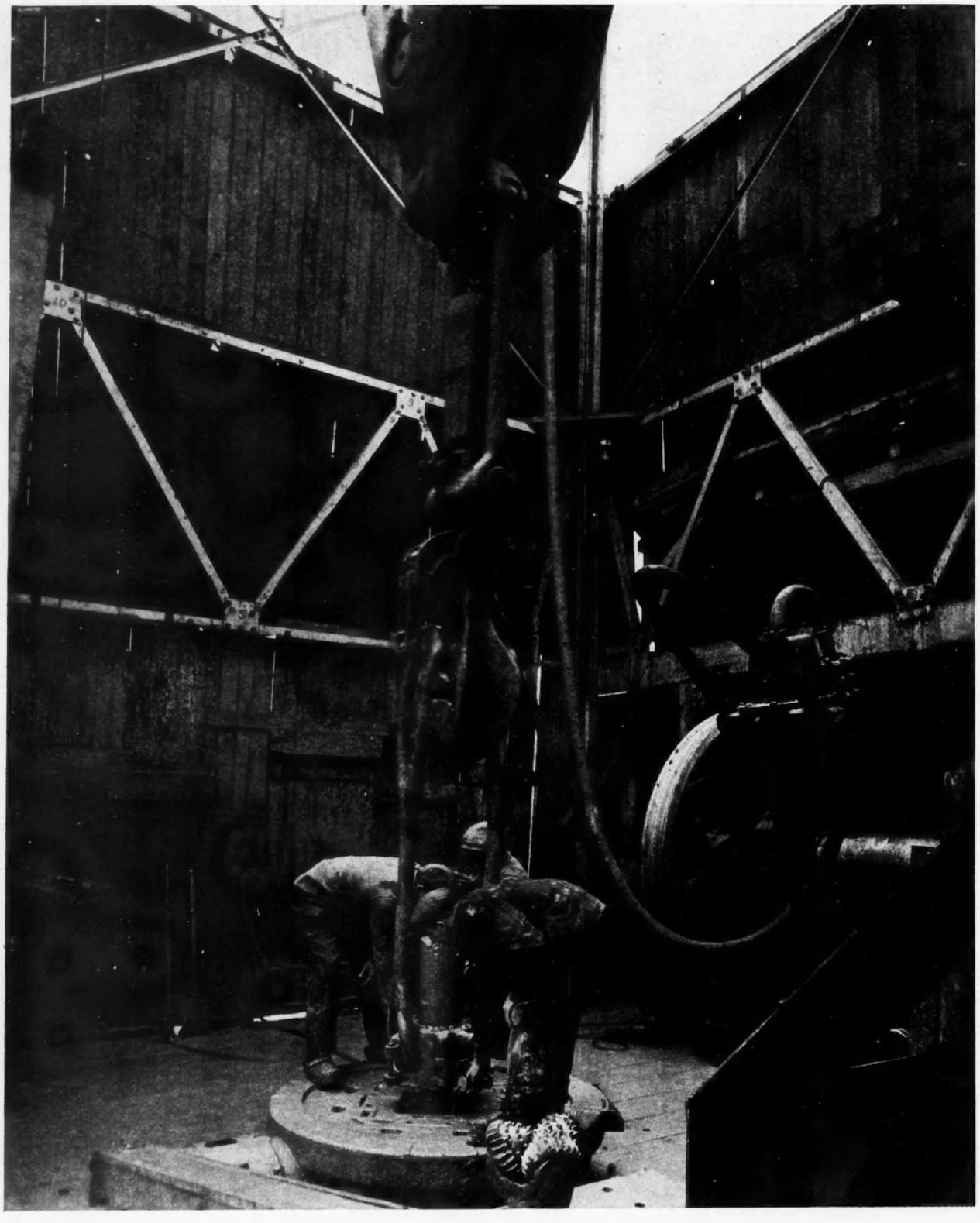


INFERNO LOW PRESSURE GAS BURNER
Bulletin No. 13

INFERNO Boiler GAUGE COCKS
Stainless Steel---Navy Bronze
Bulletin No. 9



INFERNO SAFETY VALVES A. S. M. E. STANDARD
Bulletin No. 11



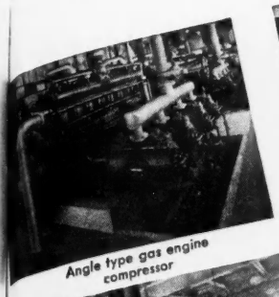
Deep exploration drilling in the vicinity of Pechelbronn calls for heavy rotaries such the above rig which was in use there in 1938.

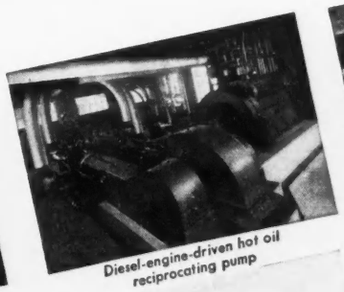
The Pechelbronn depth record of 5180 feet was recently established at Hirtzbach (Haut-Rhin) by a portable cable rig with rotary combination.

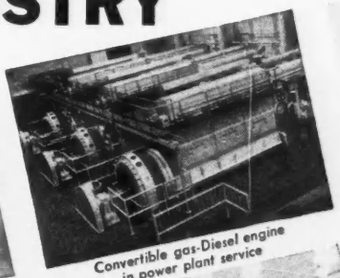
All drilling and pumping rigs are equipped with a.c. electrical motors, purchased power being available in every point of France.

(b) **Logging and Completing.** The southern part of the oil field (southwest region of Haguenau) does not present any difficulty, the oil bearing strata being placed between 200-450 meters (about 650-1500 feet) and relatively regular; the point of shutting off water is easily determined in advance.

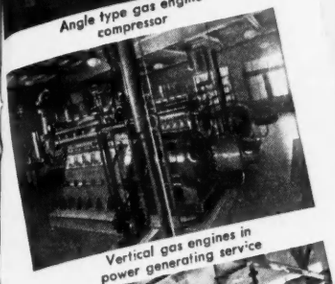
WORTHINGTON EQUIPMENT for the PETROLEUM INDUSTRY

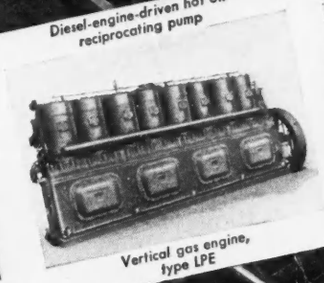

Angle type gas engine compressor


Diesel-engine-driven hot oil reciprocating pump

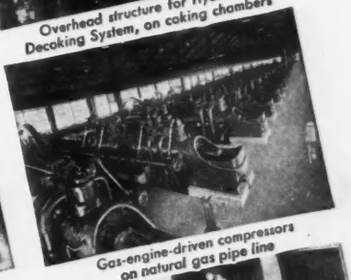

Convertible gas-Diesel engine in power plant service

Overhead structure for Hydraulic Decoking System, on coking chambers

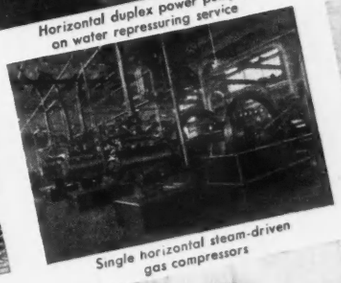

Vertical gas engines in power generating service


Vertical gas engine, type LPE

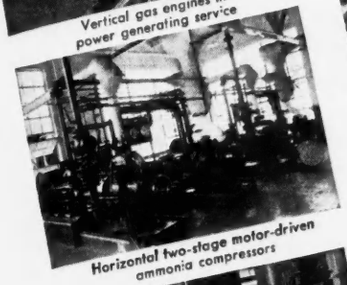
Horizontal duplex power pumps, on water repressuring service

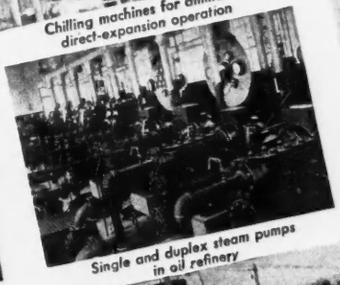

Gas-engine-driven compressors on natural gas pipe line

Chilling machines for ammonia direct-expansion operation


Single horizontal steam-driven gas compressors

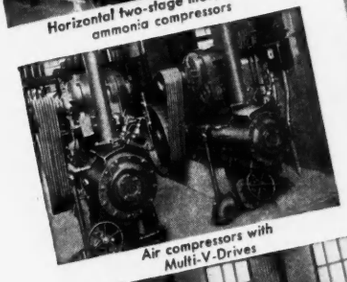
Steam-turbine-driven gene-ator unit

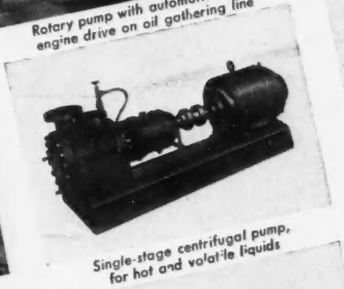

Horizontal two-stage motor-driven ammonia compressors


Single and duplex steam pumps in oil refinery

Rotary pump with automotive type engine drive on oil gathering line

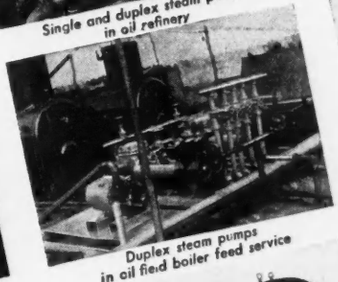
Engine-driven centrifugal pump, water service and transfer purposes

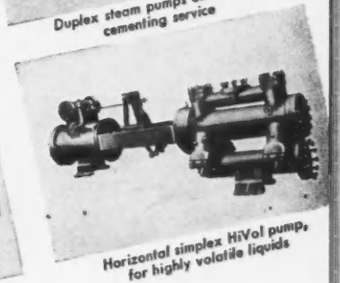

Air compressors with Multi-V-Drives


Single-stage centrifugal pump, for hot and volatile liquids

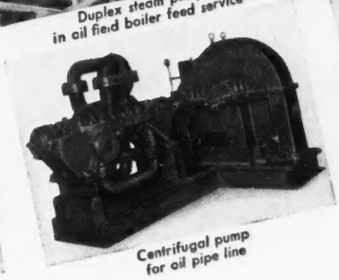
Duplex steam pumps on oil well cementing service

Horizontal triplex gasoline pumps


Duplex steam pumps in oil field boiler feed service


Horizontal simplex HiVol pump, for highly volatile liquids

Centrifugal hot oil pump, driven by Moore steam turbine


Centrifugal pump for oil pipe line

Gasoline-engine driven gathering pump

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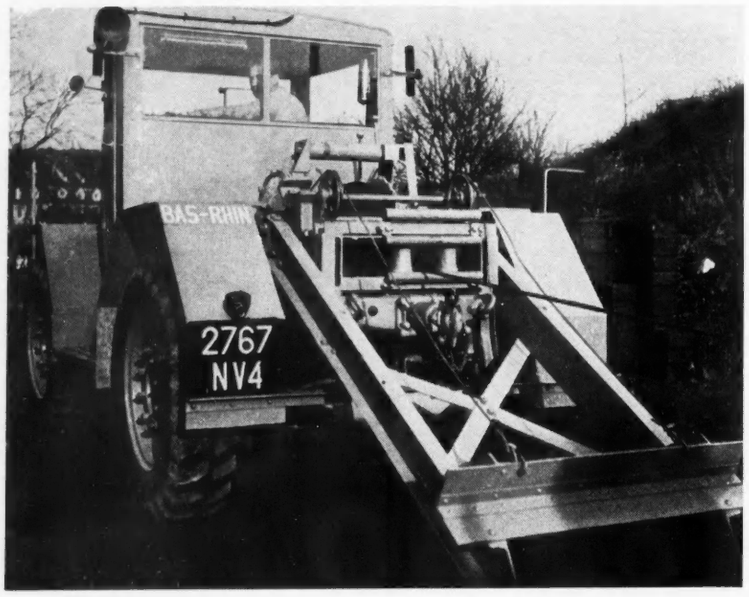


Servicing units used in Pechelbronn sometimes are four-wheel-drive trucks equipped with a pulling winch and an anchor spade.

In the northern part of the field (region of Pechelbronn-Kutzenhausen) the presence of many water-bearing horizons interstratified with the oil-bearing zones has given advantage to a method which uses more the means of sampling and electrical logging described above. This method, being also a method with us for deep exploration drilling, is the following:

Excepting the surface casing or in the case of excessive formation difficulties, the drilling operation takes place without casing to the final depth, with reverse circulation through the presumed oil bearing formations, which are afterwards logged electrically; the doubtful points of graph are verified by wall sampling. The single casing is then cemented (sometimes by multiple stages) and perforated, firstly from below, on the level of presumed producing layers.

When the bored horizon is water-bearing, the openings are plugged back with cement, or by cementing a blank liner within the first casing and eventually perforating again, or simply by squeezing cement into the perforations. This last method is perhaps the most economical and efficient.

We are able now to separate without difficulties the oil-bearing formations from water-bearing ones within a distance of 10 feet.

Example

As an illustration of the above method, we give hereafter drilling and completion data of well No. 3875. Circulation was reversed from 335 meters (stratigraphic mark of red bed shown by examination of cuttings) to bottom at 510 meters. After electrical coring, 8-inch casing was landed and cemented with 80 sacks (4 tons) of cement. Results of sampling, logging and gun perforating are shown in the table.

Cementing in two stages became necessary because a mistake in the calculation of hole capacity had led to use in the first cementing job of an insufficient amount of cement, which had raised only to 335 meters. The mistake was indicated by thermometric logging. Recementing was done through perforations at 315 meters. But after the perforating test at 302 meters, only a little oil was recovered. Finally the well was brought in with an initial output of about 60 barrels.

(c) **Drilling Mud.** That question will be dealt with in a separate article; it will be said here only that at Pechelbronn great importance is given to the mud problem, a good mud being not only the main requirement of safe drilling without casing, but also of correct sampling and logging.

Production

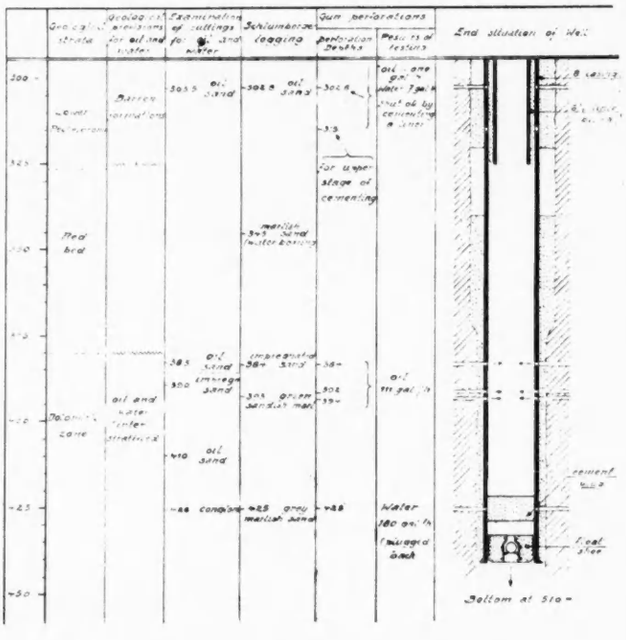
Oil production from boreholes is about 55 percent of the field's total.

(a) **Pumping**. Taking into consideration that Pechelbronn crude oil yields a great amount of lubricants (about 20 percent of the French annual consumption), and the shallow depth, low individual well yields are paying; the average day-output of a well is about 1½ barrels.

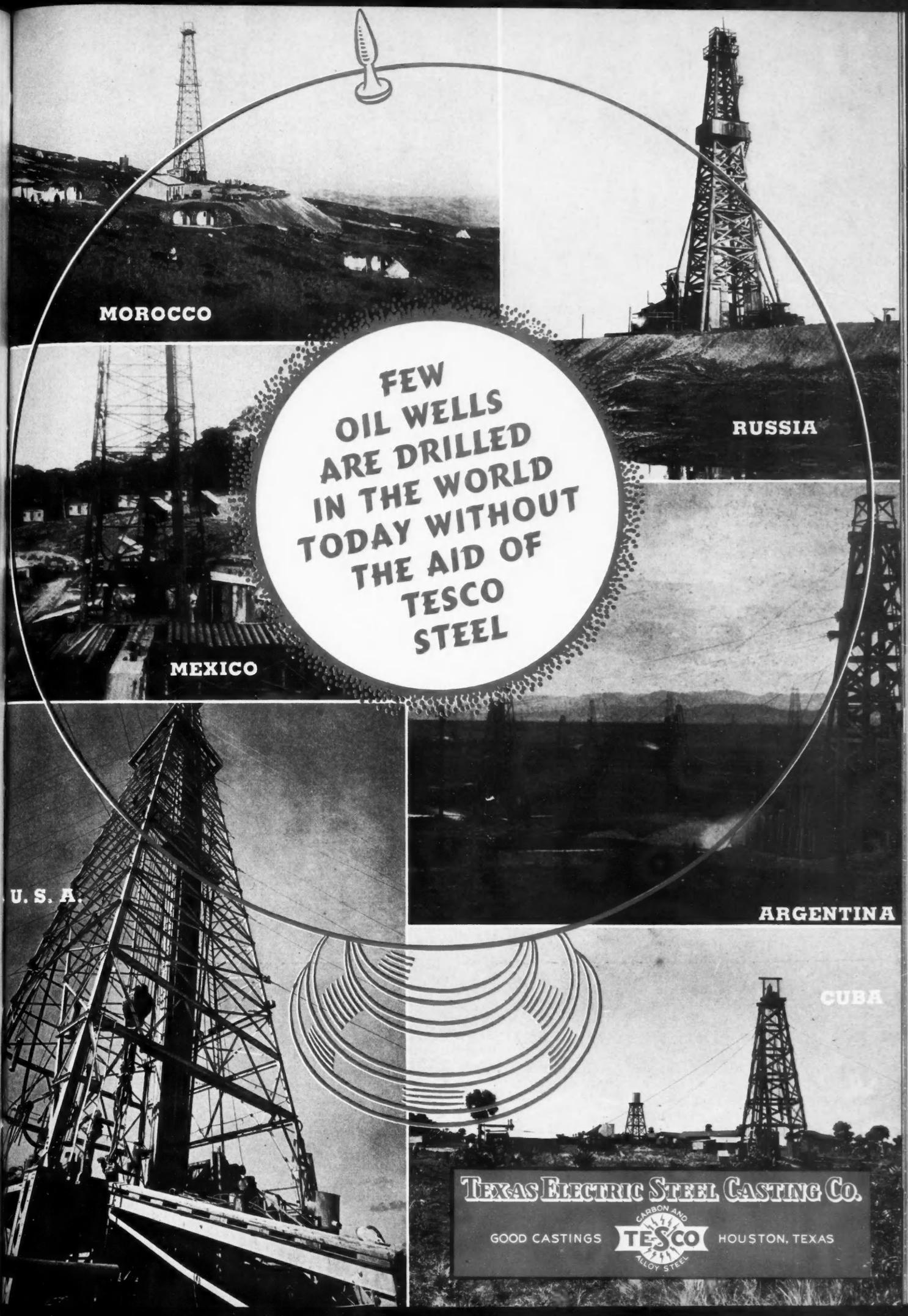
Pechelbronn Oil Company has a tendency to stand-

WELL N° 3875 (rig n° 10)

(KUTZENHAUSEN)



NOTA Small discordances between drillers depth and electrical logging depth are of no importance, the electric cable being measured much more accurately than the drill pipe, and gun perforating being made with the same cable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ARE DRILLED
IN THE WORLD
TODAY WITHOUT
THE AID OF
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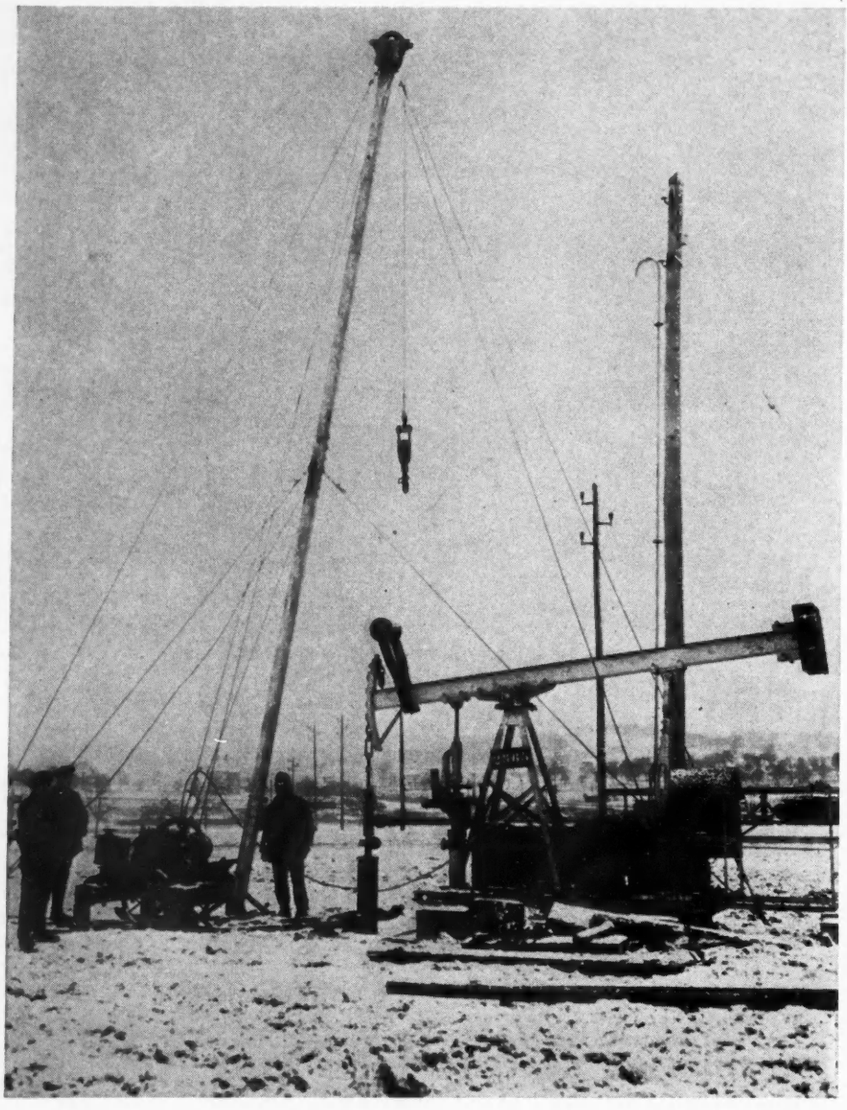

One of Pechelbronn's individual pumping units, driven by motor and reduction gear. It is operated by a portable pulling hoist and a portable duralumin pole.

ardize on light pumping units, wholly welded, with electrical motor and reduction gear. In the early days every pump was provided with a light derrick for repair work by a portable pulling unit; now the practice is to use ultra light duralumin poles, which are easily transportable.

The installation of central pumping power is rarely possible, the concession surface being often covered with forests, hills and many cultivated fields.

(b) **Repressuring.** Dealing with full recovery of oil in the southern field, Pechelbronn Oil Company has discerned that the mine system could be the cause of many difficulties. In this region indeed, oil bearing formations are especially broken, forming small lenses disseminated into a group of slightly inclined bands.

Repressuring, or perhaps rather air-drive, first experiments are being tried. The air-lift, considering the low output of producing horizons, can be useful only in a discontinuous way, that is, by employing the successive "kick-offs."

The place chosen for the realization of the repressuring is a tectonic compartment, where the oil-bearing strata are placed on a total thickness of about 135 feet. The complex was divided arbitrarily into two sets of equal thickness, for each of which was appropriated one intake well. The first well was cemented above the complex and stopped in its middle, the second, set on bottom of complex, was cemented half way down.

The experimental compressor plant contains one compressor of 88 cubic feet under 1000 pounds per square foot. The intake pressure oscillates between 280-310 pounds. The first results show that in 10 wells reached by repressuring in a radius of 1300 feet the average increase of oil production was 60 percent, the water output decreasing simultaneously 35 percent.

1937-1938 Statistical Data

(1) Well completions during 1937: Total number of drilled wells was 85, of which 10 were deepened; total number of successful oil completions was 63, of which 4 were deepened; total number of failures was 22, of which 6 were deepened.

(2) Production during 1937: Total oil production was 70,250 tons of crude, of which 41,211 tons was from wells and 29,039 tons was from mining.

(3) Production during 1938: Total oil production was 71,807 tons of crude, of which 41,601 tons came from wells and 30,206 tons from mining.

(4) Outlook for 1939: No appreciable change, excepting the case of successful exploration test.

(5) Length of pipe lines constructed during 1937 was 1400 meters. In all we have 158,397 meters of pipe lines.

Conclusion

The exploration trend is now in the direction of greater depth, towards the investigation of secondary and primary horizons. At the same time, the formation becomes harder; the flush-percussion system is confined to the first 400 meters so that use of the rotary system is expanding, especially where the conditions are difficult for cable tools.

A new trend appears now in favor of drilling to final depth without testing, allowing the cementing of a single string of casing and completion by gun perforation.

Pechelbronn is continuing the methodic examination of drilling mud.

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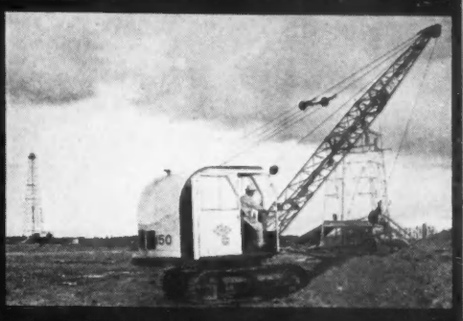
This P&H Model 150 handling tank plate is a big money saver on erection work.

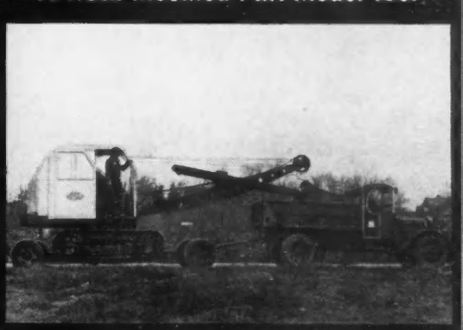
The P&H Model 150 as a Shovel.



The P&H Model 150 as a Dragline.

The P&H Model 150 as a Trench-Hoe.

A Truck-Mounted P&H Model 150.



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Will New Zealand Yield Commercial Production?

Chances of success in current venture brightened by use of modern technique and heavy rotary drilling equipment

By HOBART LA MAR, Drilling Superintendent,
New Zealand Petroleum Company, Ltd.

WHETHER or not New Zealand is to join the ranks of oil-producing countries of the world may be decided by the series of tests to be made on large concessions granted by this government to the New Zealand Petroleum Company, which is now drilling its initial test well on the Totangi Dome.

This all-important venture is situated in the Poverty Bay District, 23 miles from Gisborne on the east coast, and about midway between Auckland and Wellington—New Zealand's largest cities.

While this wealthy sheep district belies the name given it by Captain James Cook, first white man to land upon its shores in 1769, it would be further enriched should drilling on the verdant hills reveal the presence of prolific oil sands beneath them.

Maori Traditions

Traditions relating to oil seepages in various parts of the East Coast were handed down by the Maori indians from ancient times. To a locality at Whatatutu, where

New Zealand Petroleum Company's Totangi campsite in the Poverty Bay Hills near Gisborne

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The Kinzbach line of whipstocks and milling tools, partially shown here, offers many combinations by which any type of re-drilling job can be quickly and economically performed. Operators the world over know, from experience, the dependability of Kinzbach equipment and accept them as standard for re-drilling work.

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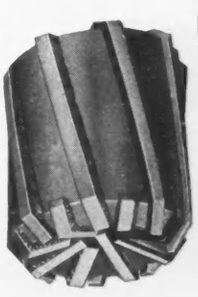

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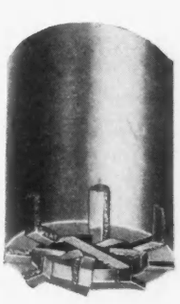

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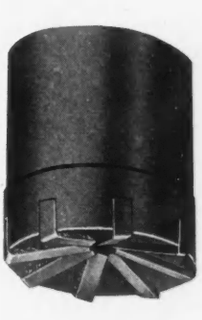

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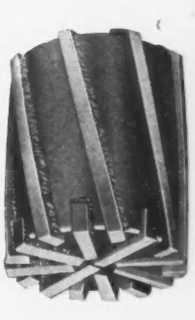

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KINZBACH

Then . . .
In 1889 prospecting on Waitangi Hill ("the hill of the stranded whale") was blocked by inability of available equipment to cope with subsurface conditions encountered.

The above picture of one of the first wells drilled at Waitangi Hill calls to mind the legend among the Maori indians that the seepages evolved from a stranded whale.

seepages are prevalent in large numbers, they gave the name of Waitangi—"Hill of the Stranded Whale," the belief being legend among them that these seepages evolved from that source.

An effort to exploit these seepages was made by Taranaki Syndicate in 1874, when a timbered shaft was sunk to a shallow depth, but was abandoned because the workmen were unable to make further progress due to gaseous conditions. This pioneer work was being done while the North Island was in the throes of guerilla warfare with Maori indians. This colorful locality has been the scene of several unsuccessful tests since the early pioneer well, and the last activity terminated in 1931 after the Taranaki Oil Fields, Ltd., were forced to abandon two rotary drilled holes at less than 2000 feet, because of caving shales and depleted funds.

Early Development

Despite the numerous failures on Waitangi Hill, it has not been erased from the map of possible productive domes, and it is at present being further geologized with every indication that a recommendation to drill will be the result of this survey.

Since this early venture, intermittent searches have resulted in three score wells being drilled throughout New Zealand with depths ranging from 100 to 5680 feet. With the exception of minor successes by the Moturoa Oil Fields, Ltd., at New Plymouth on the west coast, in which semi-commercial production was achieved in three wells, nothing tangible has been accomplished toward proving the existence of a major field.

After reviewing the records of the holes drilled and equipment used in the past exploration work, it is evident that antiquated drilling equipment played an important part in the many failures to reach the lower levels where commercial production might have been found.

Until a scant few years ago, all prospecting had been done with cable tools, which is largely responsible for the long list of abandonments at shallow depths, and the few rotary drilled test holes were drilled with light and underpowered rigs. In addition to the above, high gas pressures and caving shales brought to a standstill

at relatively shallow depths all wildcat ventures on the east coast.

Production

Prior to 1930, New Zealand production would have made small figures in gallon computations, and even with minor success by the Moturoa Oil Fields, Limited, at New Plymouth on the west coast, production can barely be called commercial. However, the small depleting pool tapped in that region gives encouragement to prospecting companies seeking major reservoirs elsewhere in New Zealand soil. Hopes for commercial production were revived when the Moturoa 1 was brought in as a small producer at a depth of 3310 feet. Drilling was commenced on this well March 1, 1930, and the well was completed November 13 of the same year. Highly expectant of the fruition of new born hopes after this success, three additional wells were drilled in the New Plymouth area by this company before drilling was finally suspended in April, 1934.

While three of these wells came in as fair producers ranging from 50 to 100 barrels per day, production rapidly declined, and at present the combined output amounts to 11 barrels daily, with sufficient gas accompanying this small flow of oil for fuel purposes. Although these wells have produced but approximately 45,000 barrels to date (December 22, 1938), it is quite likely that production could be increased in these producers if present-day knowledge was put into force.

Cable tools were used in the drilling of these wells.

What are believed to be the first complete tables of completions in New Zealand ever printed in America are shown herewith.

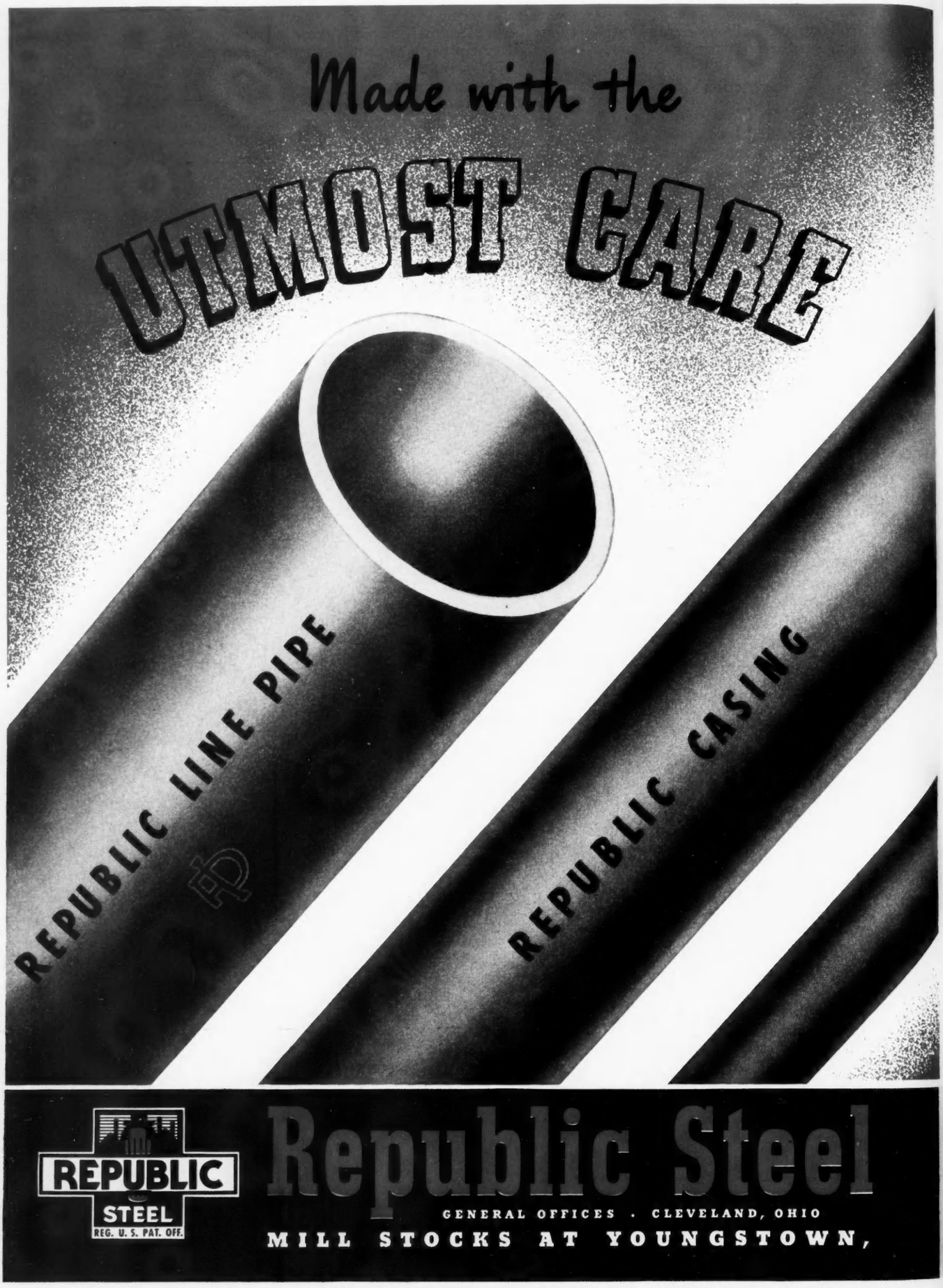
Oil seepages in various parts of New Zealand have lured the early prospectors into drilling in their immediate vicinities, hopeful that "black gold" would be found at shallow depths. Present day geological information points to greater depths, and it is apparent that modern methods and heavy drilling equipment will be just as necessary to wrest the secret from Mother Earth in New Zealand as in other parts of the universe.

Americans On Job

With the invasion of two American oil companies, combined with Australian capital, operating under

Now . . .
With the modern equipment, a rig designed to go to 12,000 feet and fitted with pressure control paraphernalia, New Zealand's chances of production are brighter.

Totangi 1, with its 136-foot derrick, heavy Diesel motors and modern pressure control equipment is affording natives of Poverty Bay a view of a drilling rig of a type they never saw before.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Wells Drilled In Taranaki District*

No.	NAME OF WELL	Date Completed	Total Depth (Feet)	Result
1	"Alpha" (or "Oil or London"); Carter et al. (Sold to Taranaki Petrol Co.)	1867	180	3 bbls. per day.
2	Well "No. 1" (Taranaki Petrol Co.)	....	310	.....
3	Well "No. 2" (Taranaki Petrol Co.)	1866	318	.....
4	"Victoria" (or "Oil or Dublin"), Peoples Petrol Co.	1867	516	.....
5	"Beta" (or "Oil or Edinburgh"); Taranaki Petrol Co.	1868	684	1½ bbls. in 12 hrs.
6	Booth's; N. Z. P. & I. Syndicate and Samuels Syndicate	1891	930	4 bbls. per day.
7	Samuels No. 2, Samuels Syndicate	....	1100	10 bbls. per day.
8	Mace's, Herekawe, or Samuels No. 3; Samuels Syndicate	1895	1354	Dry.
9	Putt's or Samuels No. 5; Samuels Syndicate	1898	2053	Prod. 8,600 bbls. 1912–15.
10	Okey's, or Samuels No. 6; Samuels Syndicate	1898	302	Dry.
11	Veale's, or Samuels No. 7; Samuels Syndicate	1899	1345	Dry.
12	Taranaki No. 4, Taranaki Petrol Co.	1907	1678	Dry.
13	Bonithan No. 1, Bonithan F. P. E. Co.	1908	3005	Show oil and gas.
14	Bonithan No. 2, Bonithan F. P. E. Co.	....	2505	.....
15	Omata Bore; New Plymouth Petrol Co.	1907	1060	Show oil and gas.
16	Moa; Moa Petroleum Co.	1908	460	Traces of oil.
17	Norfolk Road; Inglewood O. Bor. & Pros. Co.	1908	2500	Traces of oil.
18	Vogeltown, or Bullock's, Taranaki Oil & Dr. Co. (Ltd.)	1909	1385	Show oil and gas.
19	Roy's, or Taranaki No. 2, Taranaki Petrol Co.	1910	3030	Prod. 9,696 bbls. 1910–12.
20	Taranaki No. 5, Taranaki Petrol Co.	1912	2644	Prod. 10,000 bbls. to June, 1914.
21	"Birthday," or Taranaki No. 1; Taranaki Petrol Co.	1914	2340	Flowed oil.
22	Samuels No. 4 or Taranaki No. 3, Samuels Synd. (Sold to Taranaki Petrol Co.)	1914	2015	Prod. 5,382 bbls. 1910–13.
23	"The Rotary"; Taranaki Petrol Co.	1914	2250	Prod. 570 bbls.
24	Bell Block No. 1	1914	2820	Show oil and gas.
25	Bell Block No. 2	1914	2855	Show oil and gas.
26	"Phoenix"; Phoenix Oil Co.	....	2300	Show oil.
27	"Hadley's," or Carrington Road Bore; New Zealand S. O. Co., Ltd.	....	3240	Show oil and gas.
28	Petch's; British Petrol. Dev. Co.	....	360	Show gas.
29	United	....	500	.....
30	Huiroa	....	4921	Show of gas.
31	"Blenheim"; Blenheim Oil Co., or Taranaki O. L. & D. Co.	....	5680	Initial 50 bbls.; Prod. 2,980 bbls.
32	Tarata No. 1, Taranaki Oil Fields, Ltd.	1926	5010	Several showings of gas.
33	Moturoa No. 1, Taranaki Oil Fields, Ltd.	1926	4360	Good showings of oil, several points. Gas (CO_2=72%) at 1,555 ft. 5,000,000 cu. ft. per 24 hrs.; rock pressure 623 lbs. per sq. in.
34	Moturoa No. 1; Moturoa Oil Fields, Ltd.	1930	3310	Producing.
35	Moturoa No. 2; Moturoa Oil Fields, Ltd.	1931	2127	Producing.
36	Moturoa No. 3; Moturoa Oil Fields, Ltd.	1932	2147	Dry.
37	Moturoa No. 4; Moturoa Oil Fields, Ltd.	1934	2230	Producing.

* Compiled from New Zealand Geological Survey Records.

Wells Drilled In East Coast District

No.	Locality	Company	Date	Total Depth	Result
1	Waitangi Hill	Poverty Bay Oil Co.	1874–75	210	Oil.
2	Waitangi Hill	South Pacific Oil Co. Wells 1–8	1882–86	400–470	Shows of oil.
3	Waingaromia Valley	South Pacific Oil Co. No. 9.	1887	1321	Gas (?).
4	Waipaoa Valley	Minerva Petrol. Co.	1887–88	750	Dry.
5	Waitangi Hill No. 1	Gisborne Oil Co.	1909	1478	Oil.
6	Waitangi Hill No. 2	W. D. Lysnar & John Clark.	1919	845	Dry.
7	Ruatorea	Southern Cross Petrol. Co. No. 1	1881–83	400+	Show of oil.
8	Ruatorea	Southern Cross Petrol. Co. No. 2	1881–83	500+	Dry.
9	Ruatorea	Southern Cross Petrol. Co. No. 3	1881–83	400+	Dry.
10	Ruatorea	Southern Cross Petrol. Co. No. 4	1881–83	100+	Dry.
11	Ruatorea	Southern Cross Petrol. Co. No. 5	1883	1836	Gas.
12	Totangi Station	London Oil Syndicate No. 1.	1897	338	Trace of oil and gas.
13	Totangi Station	London Oil Syndicate No. 2.	1897	258	Show of gas.
14	Totangi Station	N. Z. Oil Fields, Ltd., No. 1.	.....	273	Dry.
15	Totangi Station	N. Z. Oil Fields, Ltd., No. 2.	.....	513	Dry.
16	Waihirere	N. Z. Oil Fields, Ltd.	1912	1381	Show of gas.
17	Waipatiki No. 1	"Shell" Co.	.....	1800	Dry.
18	Waipatiki No. 2	"Shell" Co.	.....	3600	Show of oil and gas.
19	Eketahuna No. 1	"Shell" Co.	.....	3000	Trace of oil and gas.
20	Ruatorea	Taranaki Oil Fields, Ltd.	1926	2540	.....
21	Tokomaru No. 2	Taranaki Oil Fields, Ltd.	1927	3260	Dry.
22	Morere—Gisborne No. 1	Taranaki Oil Fields, Ltd.	1928	3040	Gas.
23	Mangaone Gisborne No. 2	Taranaki Oil Fields, Ltd.	1929	3910	Show of oil and gas.
24	Waitangi No. 1	Taranaki Oil Fields, Ltd.	1931	1682	Dry.
25	Waitangi No. 2	Taranaki Oil Fields, Ltd.	1931	2172	Dry.

in making conclusive tests, this company has begun its task with modern deep-drilling equipment capable of reaching 12,000 feet. Well aware of the elements that may make the "wildcat" wilder—blow outs, caving formations, and loss of circulation are well provided for with 6000-pound test preventers and pressure drilling hookups, not forgetting mud treating chemicals and weight agents.

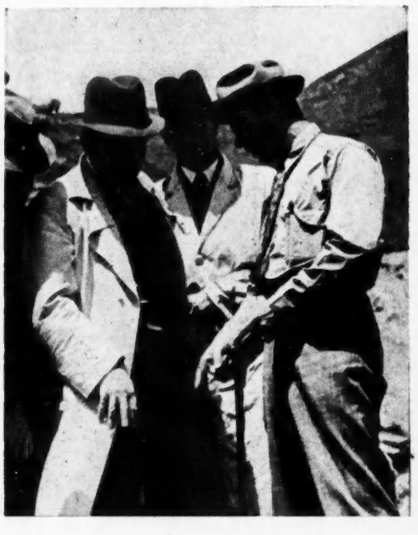
Totangi 1, with its 136 feet height and 1,000,000-pound capacity derrick, presents a spectacular scene towering amid Poverty Bay's hills, and the bark from the exhausts of three 200 H.P. Diesel rig drive motors issues a challenge to the world's most modern prospecting equipment.

Camp building, road construction, and preparation for the drilling site of Totangi 1 began with the beginning of New Zealand's rainiest winter in 60 years. Impeded by frequent deluges and landslips, the heavy equipment was finally transported to the location and the initial venture by the New Zealand Petroleum Company was spudded in October 12, 1938.

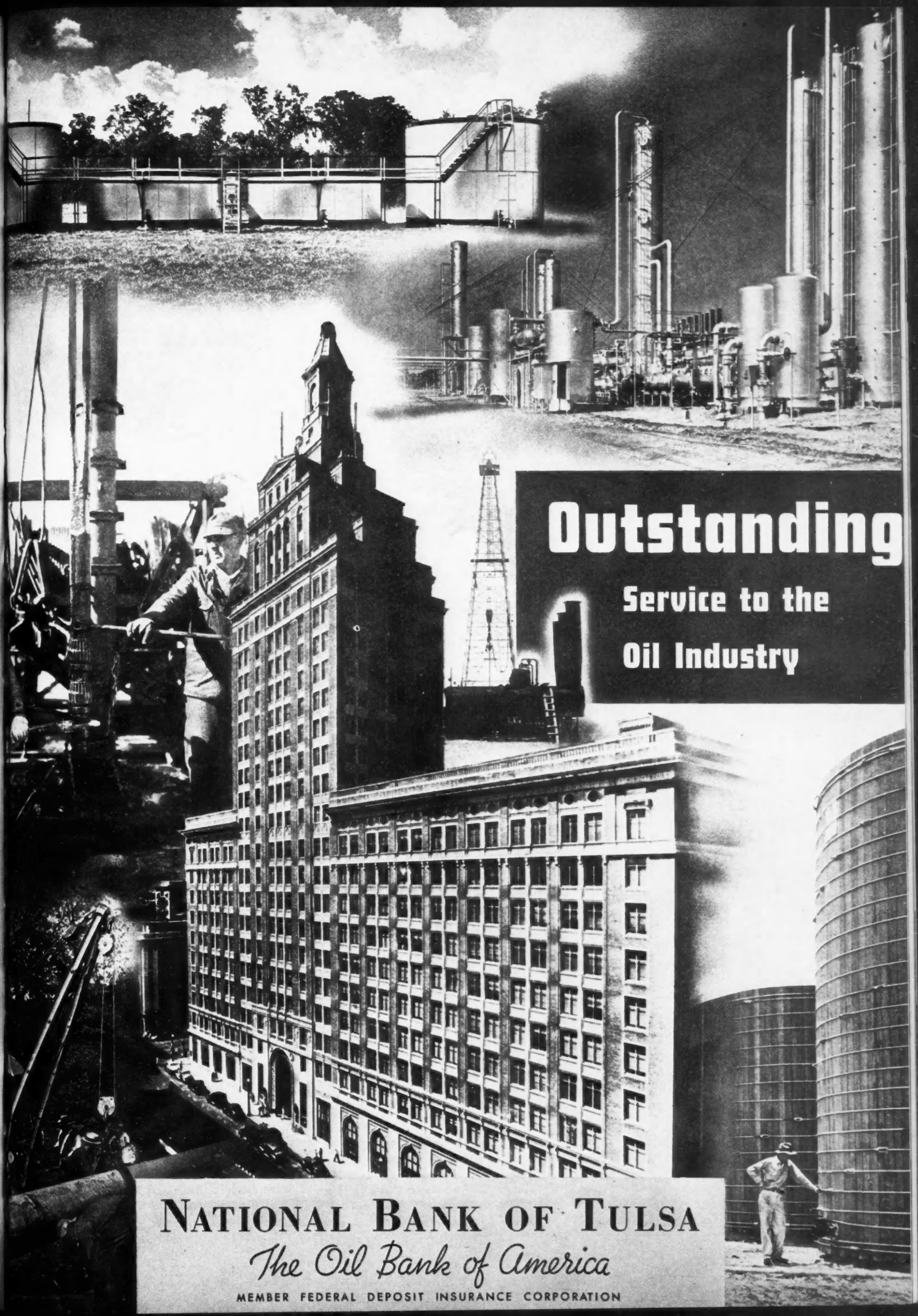
Hard sandstone formations and steep dips are expected to be encountered. Because of the name of the New Zealand Petroleum Company, failure to prove or disprove the existence of petroleum on the structures to be tested will hardly be attributed to lack of funds or inadequate equipment.

With the realization that indeterminate depths may be necessary

TELLING THEM



The author, at right, is explaining to Hon. P. C. Webb, left, minister of mines, and Hon. Semple, minister of transport, how some of the drilling equipment at Totangi 1 operates.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countered in east coast drilling, which makes straight holes most difficult even with modern directional drilling control equipment. With the impending entry of the Shell Company, competitive prospecting will be under way by veteran producing companies.

Will advanced practical and technical knowledge, combined with modern deep drilling equipment, solve once and for all New Zealand's prospects of becoming an addition to the oil producing countries of the globe?

Another Angle on New Zealand's Chances for Commercial Production

By F. W. JOHNSTON,
Christchurch, New Zealand

F. W. Johnston's observations on New Zealand's current flurry of prospecting, as expressed in a letter to the foreign editor of The OIL WEEKLY early this year, cover some points not touched on by La Mar, author of the foregoing article on New Zealand. Johnston predicts a busy time for geophysicists in the Taranaki district, where doing surface geology is difficult.—Ed.

FURTHER to my article in your 'International' Number in February, 1938, I am sending you a note of the progress of the exploration during the current year.

"Since January 1, 1938, the date on which the Petroleum Act, 1937, N. Z., came into force the following licenses have been granted:

District	Number of Licenses	Area Covered (Square Miles)
North Auckland	1	198
Gisborne	6	1044
Hawke's Bay	9	1367
Taranaki	19	3747
West Coast (South Island)	5	661

"Geological and geophysical investigations are being actively carried out on all licensed areas, and the first well is being drilled near Gisborne by the New Zealand Petroleum Company, Limited. A modern and most efficient plant is being used.

"Careful and detailed geological and geophysical investigations are being undertaken and the sites for bores being carefully selected. Such work is at present being carried out on a scale hitherto undreamed of in New Zealand and the activities of licensees have increased with the arrival of expert staffs from overseas.

"On December 15, 1938, New Zealand Petroleum Company reported that its Totangi 1, bore during the previous fortnight, was drilled to 2410 feet in sandstone, but owing to a deviation from the vertical developing, was filled in with cement to 2070 feet and was drilling out to correct the deviation.

"MAN BEHIND GUN"

Hon. P. C. Webb, New Zealand's minister of mines, has been characterized as the "man behind the gun" for the government in the current search for oil there.

Taranaki News

The latest news from New Plymouth (in the Taranaki district) is that, contrary to the experience in the Gisborne area, Taranaki has been found to be more suitable to geophysical survey than to geological survey, and work in future will be concentrated in the hands of geophysicists in that district. Therefore it is not anticipated that the commencement of boring in Taranaki will take place until about a year hence, as under normal conditions the boring would follow the completion of the geophysical survey in that area.

"I thought perhaps your readers might be interested in a photograph of the Hon. P. C. Webb, the Minister of Mines, New Zealand, the 'man behind the gun.' He is a typical Irishman, active as the day is long, who spent his early years in Australia and who was metaphorically 'bred' in a coal mine, and has probably a greater knowledge of coal and the coal-mining areas of New Zealand than any other one individual.

"I am sorry there is not greater progress to report, but where so much is at stake all the preliminaries have to be settled and tested in a scientific manner. It will be some little time before anything definite can be reported."

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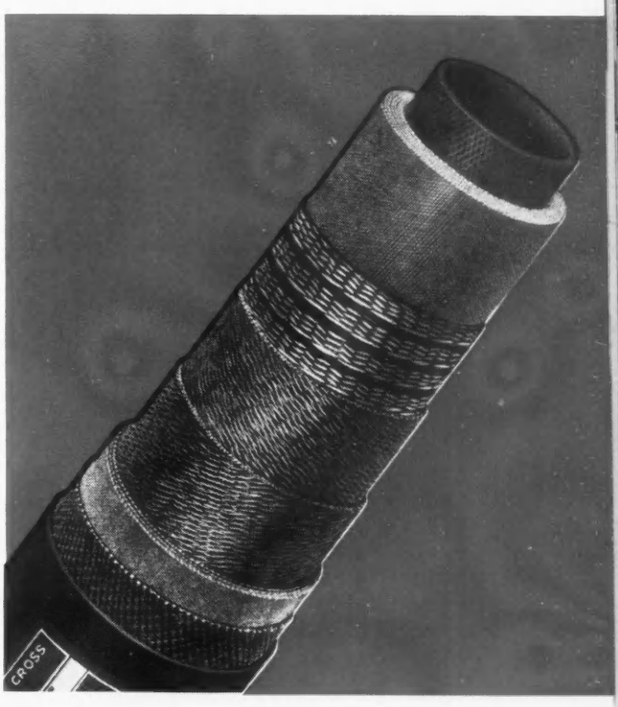

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Roumanian Wildcatting Fails to Stem Decline

Lack of new fields held responsible for drop in production to 48,984,200 barrels; footage drilled in 1938 totaled only 961,040 feet, while new producers numbered only 133.

TOTAL oil production in Roumania in 1938 amounted to 48,984,200 barrels, while in 1937 there was produced 53,239,500 barrels. This amounts to a decrease of 8 percent in 1938 and a cumulative decrease in 1937 and 1938 of nearly 24 percent.

It is expected that 1939 will show a further decrease of not less than 10 percent. This spells a decrease of at least 33-1/3 percent in 3 years, without a major discovery made in that period, or any but small ones in sight.

Drilling in 1938 amounted to 961,040 feet, a decrease of 316,880 feet over that drilled in 1937.

Of the major fields in Roumania, only Baicoi-Liliesti-Tintea and Ceptura registered any substantial increases, and the latter will, due to water encroachment, take a pronounced decline during 1939. Bucsani, Boldesti, and Moreni all declined heavily.

The only major field which is expected to show an increase is Baicoi-Liliesti-Tintea, where the deep Meotic sands in the 9000-9500-foot zone were extended during the year and should be further extended in 1939.

Important Pools

There are some 35 areas in Roumania which report production, many of which are of minor importance. Only Bacoi-Liliesti-Tintea, Boldesti, Ceptura, Moreni, and West Gura Ocnitei gave over 4,000,000 barrels of production in 1938. Of the remainder, Bustenari-Runcu, Gorgota-Ochiuri, Piscuri, and Bucsani produced over 1,000,000 barrels. Manesti, reported as a discovery in 1937, has shown no oil, and to date can claim only two dry gas wells and two salt water wells.

No new gas fields were discovered in Transylvania during the year. The 13 fields reported a total of 150,000,000,000 cubic feet of gas production in 1938 from some 25 wells.

New Development and Discovery

Wildcatting was disappointing during the year. Exploration wells were completed as follows in the table below.

Of the 10 wells listed above, two are testing production, but indications are that no major pool will be opened by either of them. There are six wildcats drilling, none of which have had showings of importance in the reserve picture of the Roumanian fields.

Legislation

Privately owned subsoil rights are confined to the immediate oil fields regions. The remainder of the territory is owned by the state. The existing mining laws have not encouraged exploration.

However, the laws are now being revised and it is anticipated that activity will take a fresh start in 1939.

A spirit of co-operation has been shown between the government and the oil industry, and among the units in the industry. With this, it is confidently expected that laws will be framed to permit work to go forward. This is important when it is realized that 40 percent of the total exports of the country come from the oil business, which also brings in from taxes, royalties, etc., some 29 percent of the national budget.

Among the companies, there exist pooling and other unitizing agreements. These have had important additions in 1938. They have prevented wasteful methods in drilling and exploiting the fields

Summary of Roumanian Wildcats

District	Locality	Company	Depth (Feet)	Formation	Result
Bacau	Berzunti	Steaua Romana 1	3662	Helvetian-Miocene	Dry
Prahova	Draganeasa	Sospiro-Astra Romana 400	4774	Helvetian-Miocene	Testing
Prahova	North Filipesti	Sospiro-Astra Romana 300	5998	Helvetian-Miocene	Dry
Prrahova	Magurele	Credit Minier-Neo Petrol 1	8439	Meotic-Pliocene	Testing
Prahova	Manesti	Steaua Romana 2	7110	Meotic-Pliocene	Dry
Pahova	Podenii Noi	Steaua Romana 1806	9764	Meotic-Pliocene	Being abandoned
Prahova	Podenii Vechi	Unirea-Neo Petrol 1	3960	Burdigalian-Miocene	Dry
Prahova	Podenii Vechi	Unirea-Cometa 1	5866	Burdigalian-Miocene	Dry
Prahova	Runcu	Unirea-Sondajul 1	7743	Meotic-Pliocene	Dry
Radauti	Horodnic	Concordia 1	4013	Cretaceous	Dry

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This rather unusual picture is a reflection of the rig shown in the lower right hand corner of the page.

and contribute much to the conservation of the petroleum resources.

F. Fischer, engineer of Bucharest, advises that Roumania is continuing the practice of sending petroleum engineers to the United States, Trinidad and Venezuela to study operating technique, and that as a result of improvement in operating wells of 1300 and 1400-meter depth are being completed in Ceptura in 30 days.

Deepest Producer

As 70 percent of the country's production comes from pumping wells, pumping continues to occupy an important position among technical problems, as do air and gas lift.

The deepest well put on production in 1938 was Colombia's 317, Prahova district, which went to 3080 meters, or 10,133 feet. It is, incidentally, the first well in the country to get production below 3000 meters. Initial production was 100 tons. In 1937 the record was held by Astra Romana's No. 134 at Boldesti, which went to 2762 meters.

Fischer advises that Roumania put 133 wells on production up to December 1, as compared with 207 in 1937 and 179 in 1936. Producer completions of 1938 were divided as follows: Tintea, 31; Ceptura, 28; Moreni, 24; Gura Ocnitea, 17; Boldesti, 13; Ochiuri, 6; Bordeni-Poenareanca, 3; Scaiosi, 2; Baicoi, 2; and 1 each at Aricesti, Pitigaia, Teis, Rasvad, Dileshti, Calinet and Runcu.

Gura Ocnitea

Gura Ocniteas' ability to maintain first rank among Roumanian producers with a total for the year estimated at 1,500,000 tons, as against 1,513,000 tons in 1937, was due primarily to old wells. In completing 17 wells up to December 1, meters drilled totaled 39,000 as against 49,644 meters drilled to complete 25 wells in 1937. The field's deepest producer is Colombia's No. 185, completed in 71 days at 1933 meters for 50 tons.

Boldesti, the country's second most important field, declined 334,000 tons to 990,000 tons in 1938. Footage drilled there was 24,000 meters as against 54,173 in 1937, a decrease of 56 percent. Completions (13 of them) were the same as in 1937. The deepest well put on production during the year was Astra Romana's No. 13, completed in 50 days at 2876 meters for 20 tons. The largest completion of the year was this company's No. 5, which made 100 tons daily from 2306 meters. Boldesti's sharp decline in production has been attributed to the cessation of repressuring.

Moreni

Moreni, another important field of Roumania, declined from a production of 975,000 tons in 1937 to 830,000 in 1938; the footage having also decreased from 60,900 meters in 1937 to 15,000 in 1938. At the end of the year one well was drilling, eight being worked over, and 246 were on production. Moreni's deepest producer of the year was Creditul Minier's No. 471, put on production in 51 days at 1939 meters.

Ceptura continues the object of special attention from four companies: Astra Romana, Steaua Romana, Romano-Americana and Creditul Minier. After a long period of inactivity, the field came back to life in 1937, when wells totaling 18,507 meters in depth were drilled. Up to December 1, 1938, 28 wells were put on production. Recovery in the field jumped sharply from 336,700 tons in 1937 to an estimated 685,000 tons in 1938. Steaua Romana's No. 215, a 100-ton well at 2339 meters, is the field's deepest producer. Drilling conditions in the field are easy, Romano-Americana having

Typical heavy duty rotary outfit used in Baicoi-Liliesti-Tintea field of Roumania.

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drilled and put No. 146 on production at 1310 meters in 19 days.

15 Rigs at Tintea

Importance of Tintea in Roumanian operations is due to continued development of the Meotic by Unirea and Colombia, a program started in the latter part of 1937. In addition to the 31 completions for the first 11 months of the year, 15 rigs are running in the field, making safe an estimate of 96,000 meters of footage for the year, or about 30 percent of the total for Roumania. Production will show a jump of about 280 percent for 1938 over 1937, when 164,000 tons were produced. The 1938 figure is estimated at 600,000 tons. Companies active in the field are Concordia, Unirea, Astra Romana and Colombia, the latter holding the year's record for completing the deepest producers in the field, its Nos. 118 and 307 having been brought in at 2645 meters. Most of the field's production comes from 2200-2300 meters.

Bucshani, which ranked first among Roumanian fields in 1936 with a production of 2,176,555 tons, and fourth in 1937 with a production of 963,100 tons, dropped sharply in 1938 to 380,000 tons, approximately 40 percent of which came from wells on the state's perimeters. No completions were recorded during the year.

Piscuri Up

Piscuri field, situated on a prolongation of Moreni field structure, in recovering 470,000 tons showed a 65,000-ton increase over 1937. Most of the production came from older wells as the year just closed saw only seven Dacian formation completions there. Footage drilled amounted to 8100 meters. Creditul Minier produces about 50 percent of the field's total. Other operators there include Astra Romana, Romano-Americana, Unirea, I.R.D.P., Grupul Petrolul Romanesc, Societatea Petrolifera Romana. At the end of the year 110 wells, 74 of which are on the state's perimeters, were on production.

Ochiuri Declines

Ochiuri, an extension of Gura Ocnitei, registered a decline in footage and production, the figures being 413,000 tons and 13,733 meters for 1937 as against 330,000 tons and 4600 meters for 1938. Completions for the year numbered 6. At the end of the year 2 wells were drilling; two were working over, and 95 were on production.

Data for compiling the accompanying table on other fields in Roumania were furnished by Fischer:

Regarding the wildcats referred to in the first part of this article, Creditul Minier, drilling in the region of Magurelle, encountered six meters of oil bearing Meotic formation at 2296 meters, opening a new area in Prahova district.

Another wildcat, Creditul Minier's test in the Chitorani area, went to 3286 meters (10,811 feet) to establish the depth record for Roumania.

Quite a few additional wildcats are drilling in Roumania, but none has developed showings of significance.

Data On Miscellaneous Roumanian Fields

Name of Field	Meters Drilled in 1938	Production (Tons) 1937	Production (Tons) 1938	Wells on Production end of year
Razvad	1,802	250,000	250,000	29
Runcu	8,000	(a)	100,000	124
Teish Aninoasa	1,522	(a)	57,000	12
Viforata	(a)	56,000	38,000	15
Margineni	(a)	38,000	27,000	6
Arbanashi	268	48,000	43,000	94
Bacau District	2,500	46,000	46,000	262
Scaioshi	2,503	(a)	2,750	2
Chiciura-Bordeni-Bushteni	414	123,000	120,000	443
Baicoi	2,300	63,000	52,000	48
Aricesti	2,249	52,000	35,000	11
Campina	(a)	30,000	33,000	64
Copaceni	290	13,700	12,000	6
Filipeshti de Padure	1,999	75,000	12,000	(a)

(a) Data not furnished.

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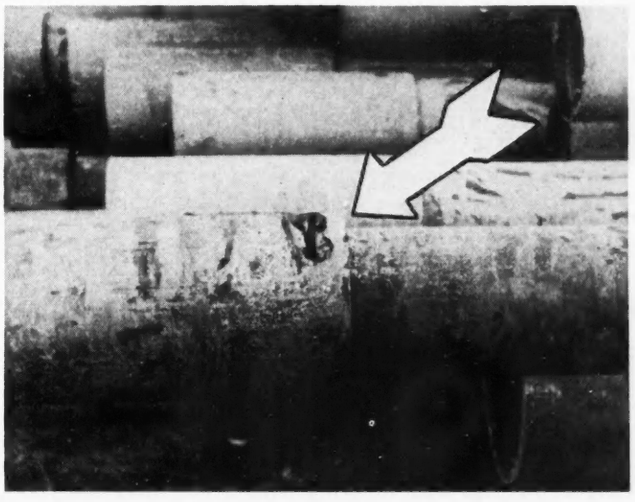
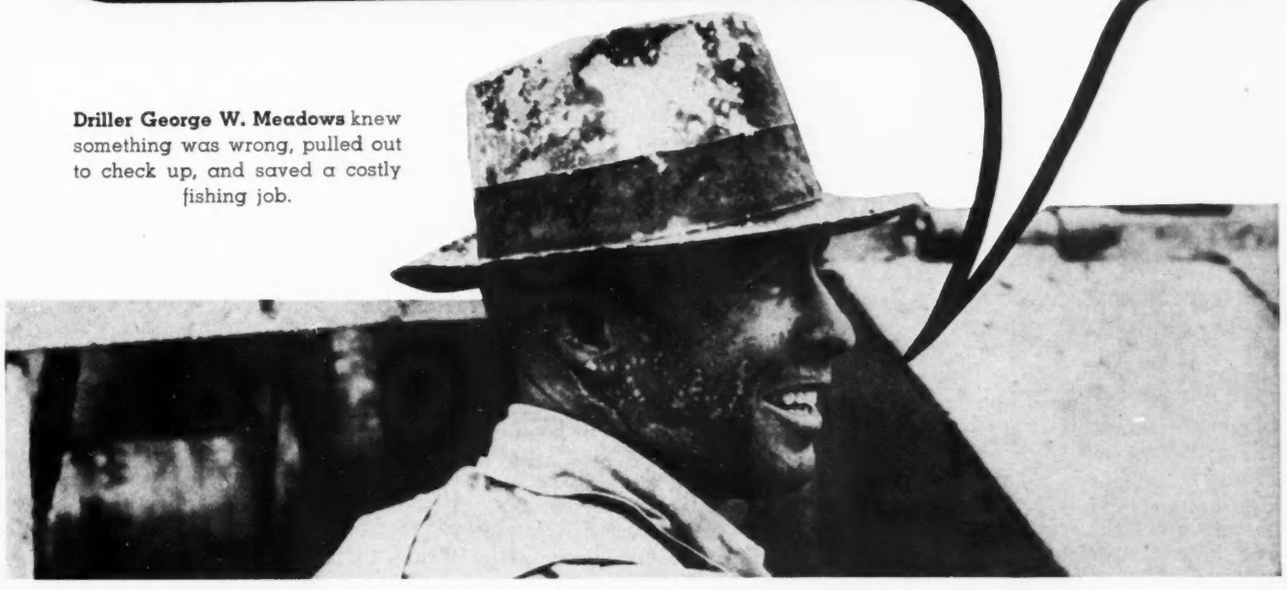


Above: The beginning of a washout which would have meant a parted drill pipe string and a tough fishing job. Right: Close-up of the Abercrombie Pressure Gauge, the self-contained dampening mechanism of which assures uniformly steady pressure readings. This gauge serves equally well for mud, water, oil, air, gas, or any liquid.



Driller George W. Meadows knew something was wrong, pulled out to check up, and saved a costly fishing job.

Results Have Not Compensated For Cost of English Drilling

Continuation of wildcatting justified because of national importance to Great Britain politically as well as commercially.

By CAMPBELL M. HUNTER, O.B.E.
Consulting Engineer and Geologist, London

OCCURRENCES of oil and cognate substances have been known in England for centuries, but it was not until the close of the Great War that systematic steps were taken to prove or disprove the presence of oil in commercial quantity.

Exhaustive survey of these phenomena showed that there had at one time undoubtedly existed important oil fields both in England and Scotland. But whether any oil now remained in commercial quantity was and still is problematical, owing to the intensive folding and faulting to which the oil bearing strata have been subjected.

Still, the search for oil in 1918 was deemed amply justified not only on grounds of national importance, but also because of the great value the discovery of oil would have in such an important market as that of the United Kingdom.

Effort Centered on Carboniferous

From the practical point of view, rocks older than the Carboniferous were ruled out because of the certainty that any oil which the Ordovician, Silurian and Devonian may at one time have held must have been lost during their subsequent folding, faulting and surface exposure. On the other hand, numerous and widespread occurrences of oil focused attention on the Carboniferous system which corresponded with a period of great deposition over the greater part of the British Isles. Unfortunately, these strata have also been subjected to intense folding followed by millions of years of exposure. Hence, the likelihood of any oil remaining in them is problematical and can only be determined by the drill.

Promising structural conditions are present on both flanks of the Pennine Range which forms the north-south backbone of England. In Scotland, in the Lothians, Lower Carboniferous rocks of the Oil Shale Group, are rich in oil indications and are now the object of systematic testing along the Couslan-D'Arcy Anticline. In the opinion of Dr. G. M. Lees, M. C., D. F. C., and P. T. Cox, chief geologists of the Anglo-Iranian Oil Company, the evidence of oil shows in the outcropping limestone of the Pennines and in coal workings is as impressive as the corresponding surface evidence in areas adjacent to many of the important Mid-Continent oil field regions of the United States.

German Influence

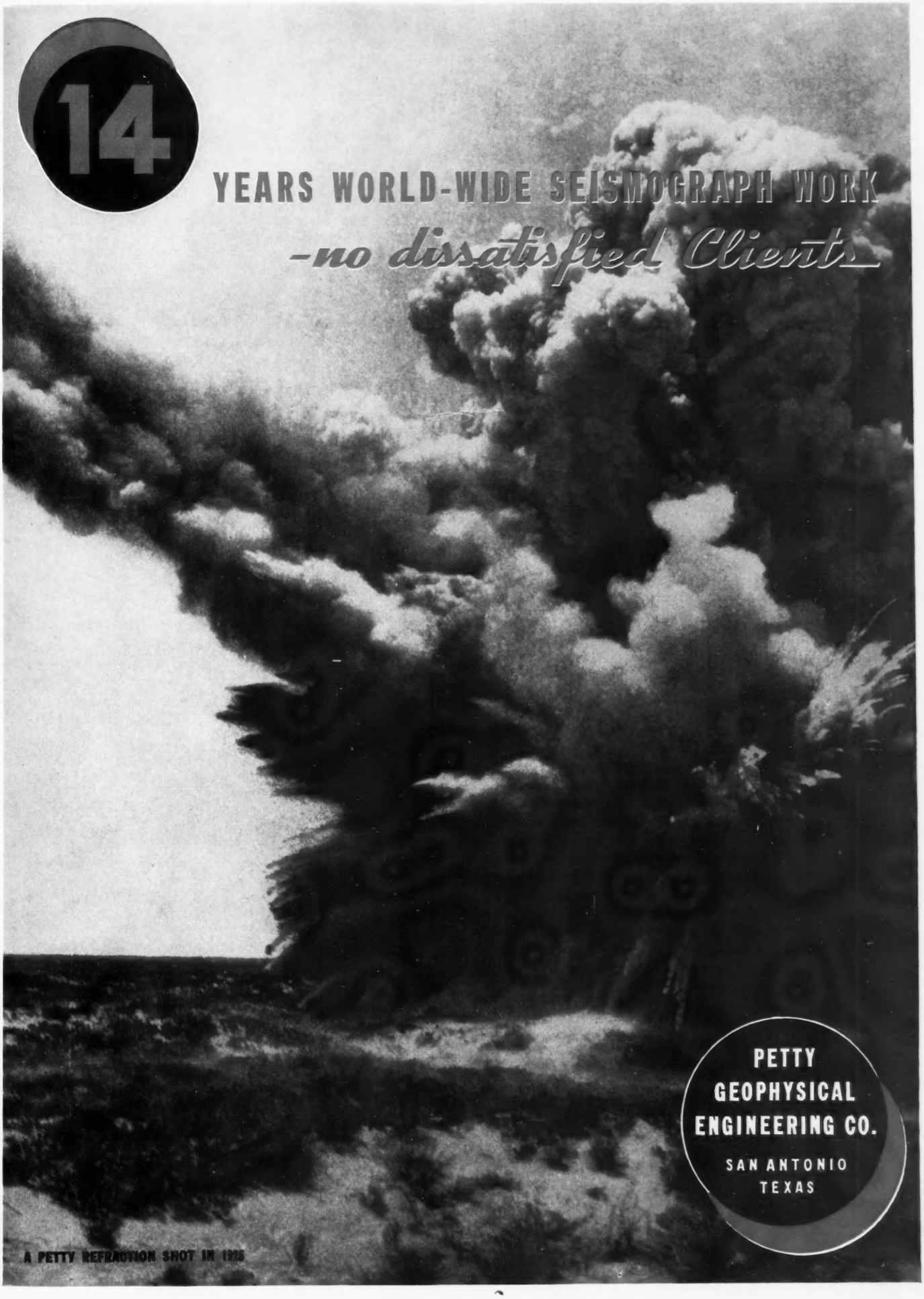
The fortuitous striking of oil in the potash mine Volkenroda in Thuringia (Germany) pointed to the possibility of oil being found in the corresponding Permian rocks in Yorkshire, especially as shows of gas and heavy oil had been struck in several wells drilled in the Tees Valley in search of coal. Drilling has therefore been initiated on what is known as the Eskdale anticline near Whitby, where overlying Triassic and Jurassic formations should provide good cover.

Numerous indications of oil are found in the Jurassics, whose outcrops extend from Yorkshire on the northeast coast to Dorsetshire on the south coast. In many localities the basal Liassic shales yield oil when heated as do also the Oxford Clay and the Kimmeridge Shales. Unfortunately, structural conditions favorable to the accumulation of oil are lacking, although there are numerous minor anticlines in the south of England and the drilling that has taken place to date has so far proved disappointing.

Lower Cretaceous Shows

Evidence of oil in the Lower Cretaceous are numerous and widespread, being associated with the Wealden beds, the thickness of which as a group runs to as much as 2200 feet. Unlike the structural conditions obtaining in the older formations, the Wealden beds are disposed in a long wide anticline extending from Salisbury in the west to Kent in the east. This important structure presents all the features of Deltaic origin, and undoubtedly at one time was an oil field, but owing to subsequent surface exposure of the porous sandstones their oil content has in all likelihood been dissipated so that it is very uncertain whether any oil now remains in commercial quantity.

The first well to be drilled in England expressly for oil was in 1902 at Heathfield in the Sussex Weald. It owed its location to the accidental discovery of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gas in that neighborhood. No oil was struck, but enough gas was found to light the railway station for many years. In 1918, under stress of the submarine menace, the British government gave Messrs. S. Pearson & Son, Ltd., the pioneers and discoverers of the Mexican oil fields, a contract to search and drill for oil. In all, 11 wells were drilled, of which seven were in Derbyshire, two in Staffordshire and two in Scotland. All were located with a view to testing the oil possibilities of the Carboniferous formation. Oil was struck in May, 1919, in the Hardstoft Well No. 1 in Derbyshire, at a depth of 3075 feet. Up to the present time some 28,000 barrels of high grade oil have been produced from this well.

The Hardstoft Well

In 1938 the D'Arcy Exploration Company, a subsidiary of the Anglo-Iranian Oil Company, took over the Hardstoft well, which has now been reconditioned and deepened to 3272 feet, with a view to testing the lower formations. Two offset wells were drilled in 1924 to 1926, but neither struck oil. One of the two wells drilled in Scotland struck a little oil on the Cousland-D'Arcy Anticline at 1490 feet, and again between 1807 and 1820 feet, at which depth it was abandoned in September, 1922, after some 50 barrels of oil had been produced.

When the war time drilling operations were suspended in 1922, some 40,000 feet had been drilled with only a small production of some 10 barrels a day having been struck in the Hardstoft well. From then on until 1933 various endeavors were made to regularize the legal status of the ownership of oil rights, and it was not until 1934 that the British government passed an act vesting the ownership of indigenous petroleum in the crown. The same act established the lines and terms on which prospecting licenses would be granted, and laid the foundation for the active drilling operations that have since taken place.

Results of Wildcats

Up to date these operations have been as follows: In the south of England five deep and two shallow wells have been drilled to test the Lower Cretaceous (Wealden) and Jurassic strata. Of these the D'Arcy Exploration Company has drilled wells at Portsdown (Hampshire) 6556 feet; Ashurst (Sussex) 5105 feet; Kingsclere (Hampshire) 5125 feet; Poxwell (Dorset) 1666 feet and Hankham near Pevensey (Sussex) 842 feet. The Anglo-American Oil Company has drilled at Grove Hill (Sussex) to 3506 feet, and the Gulf Exploration Company (Great Britain) Limited, drilled to 5600 feet near Penhurst (Kent). Further, a shallow geological bore is being drilled at Chaldon Down (Dorset) to 839 feet by the D'Arcy Exploration Company.

In consequence of the disappointing results from these wells many, though not all, of the licenses in the south of England have been given up.

One Finished in Midlands

In the Midlands, where the thick Carboniferous limestone is the object of investigation, only one well has been completed. Drilled by Steel Brothers, on the Edale anticline on the east flank of the Pennine range, it was abandoned in 1938 at 757 feet owing to the limestone being water-logged, though a little gas and patches of oil-stained limestone were encountered.

The well being drilled by the D'Arcy Exploration Company at Gun Hill, near Leek, Staffordshire, was reported at 4588 feet on January 28, 1939. It is hoped to penetrate the whole of the Carboniferous limestone in this well. As previously stated, the Hardstoft well has been cleaned out and deepened to 3272 feet, and its productive capacity is being thoroughly tested. The first oil zone has been gun perforated and will be acidized.

Arrangements have been completed for drilling a well at Eakring (Lincolnshire) to test the Carboniferous limestone in this area, the base of which is estimated at from 3000 to 3500 feet. The site, selected as the result of extensive geological and geophysical work, is about 7½ miles from the Kelham well drilled in 1923, in which several shows of oil and gas were struck.

Yorkshire Drilling

In Yorkshire, the first Eskdale well was abandoned owing to technical troubles at 2500 feet. Eskdale 2 gives promise of being interesting since it entered the Permian at 4196 feet, and has struck gas at 4212 feet, at which depth it is now drilling, 8-inch casing having been set and cemented at 4200 feet.

Strike in Scotland

In Scotland, the Anglo-American Oil Company was successful in striking a production of about 10 barrels a day of .828 specific gravity paraffin base oil and 5,000,000 cubic feet of gas in Cousland 1. Oil sands were encountered at 1733-1760 feet and 2050-2150 feet. Drilling stopped at 3857 feet after running out of the Oil Shale Group of the Lower Carboniferous into Devonian beds. The well has been carefully tested and the results have led to the drilling of Cousland 2, which was reported at 2075 feet January 28, 1939. D'Arcy Exploration Company has drilled one well on the same Cousland-D'Arcy structure about 2¼ miles north of the discovery well drilled in 1922. About 10,000,000 cubic feet of gas was struck, as well as a little oil between 1582 and 1640 feet, drilling being suspended at 2917 feet. The second well is situated on the flank of the structure in the expectation of encountering more oil and less gas. Its present depth is 1000 feet. A third well is projected at a spot 2 miles north of No. 1.

Results Not Paying

Admittedly, the results to date have not compensated for the considerable expenditure incurred, nor for the drilling of over 90,000 feet. But having regard to the geological evidences of the probable one-time existence of oil fields in Great Britain, and the rich reward that would attend the striking of oil in commercial quantity, the continued search for oil appears amply warranted.

At the end of last year 81 licenses covering 12,894 square miles out of an original 14,262 square miles were in force, representing about one-fourth of the total area of England. One thing is certain, namely, that the search for oil is being carried out in the most careful and scientific way by concerns whose experience in such matters and whose resources are such as to leave nothing to chance and to almost compel success.

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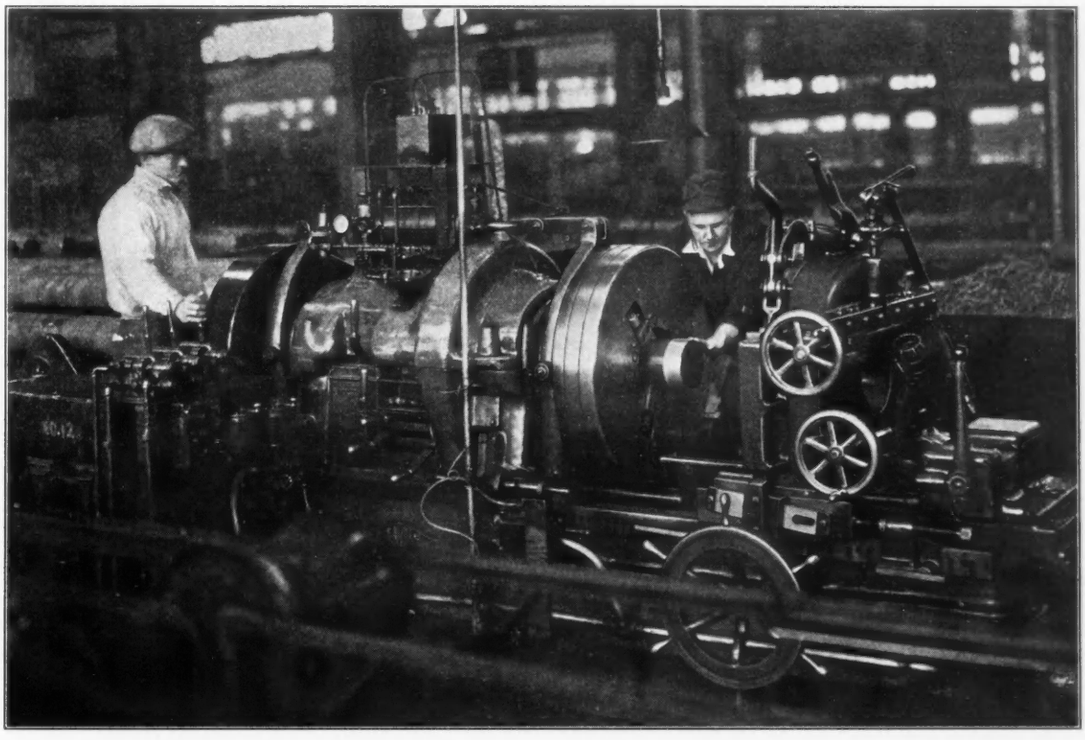

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Petroleum Problem of Brazil Hinges on Law and Technique

By MARK C. MALAMPHY, Geophysicist[1]

PART 1

RECENT issues of the newspapers and periodicals have given a considerable amount of space to comments on the new petroleum laws which have been passed by the Brazilian government. Some of these comments have been favorable and have shown at least a partial understanding of the problem of petroleum in Brazil. Others have likened Brazil to Mexico and her expropriation procedure. Nothing could be farther from the truth.

In the following article, the author attempts to explain the actual status of the petroleum problem of Brazil. The data presented has been obtained from official and semi-official publications and from his personal experiences during the more than five years he spent in Brazil as consulting geophysicist to the Brazilian department of mineral production.

Parts 1 and 2 of this article on Brazil go into the physical problems of the search for oil. Part 3 goes into the new petroleum laws and the attitude of the government toward private enterprise, concession requirements, and the conditions under which the government may take over concessions. It tells of the nation's plans for exploratory drilling.

The author spent several years in the country of which he writes as a consulting geophysicist for the government.

Salient Points of Law

An English version of the salient points of two recent laws which deal with the petroleum industry is given for the information of those persons who are more directly interested in Brazil, also an abstract of the recent treaty signed between the governments of Brazil and Bolivia.

If the data presented herein will give the reader a better understanding of the petroleum problem of Brazil and perhaps even partially convince him of the fairness of the Brazilian nation in its legitimate and logical attempts to create a national petroleum industry, then the author feels that his efforts will be well rewarded.

A.—GENERAL GEOLOGY

Space does not permit us to enter into details relative to the general petroleum geology of Brazil, nor will such details be necessary for the purpose of this article. Those readers who might desire such information are referred to the reports of the government geologists and engineers which have been published in the official bulletins (in Portuguese) of the Servico de Fomento da Produccao Mineral, the Servico Geologico e Mineralogico, and in the Revista de Mineracao e Metallurgia, all of Rio de Janeiro. A number of excellent papers dealing with the geology of certain regions of Brazil and neighboring countries are to be found (in English) in recent volumes of the Bulletin of the American Association of Petroleum Geologists and in The Oil Weekly.

Oliveira's Classification

Dr. Avelino I. de Oliveira, director of the Servico de Fomento da Produccao Mineral, has recently released his Boletim No. 23 entitled "Situacao do Problema do Petroleo no Brasil em 1938," (Status of the Petroleum Problem of Brazil in 1938), in which he summarizes the results obtained by the geologists and engineers during the last 30 years and outlines those areas in which he thinks that the search for petroleum should be intensified.

The sketch map of Figure 1, taken from the above mentioned Boletim No. 23, shows, Dr. Oliveira's classification of various regions in Brazil relative to their geologic possibilities for the existence of petroleum. The captions on this map are self explanatory.

On this map are shown two immense and several small areas underlain by crystalline and metamorphic rocks. The area north of the Amazon river extends over into southern Venezuela and the Guianas and represents the remains of the old Guiana continent. The area to the south which occupies a great part of central Brazil represents the remnants of the ancient Brasilia continent. The smaller areas are found in the states of Maranhao, Bahia and Rio Grande do Sul.

These areas are composed of gneisses, mica-schists and dolomitic limestones with intrusions of granites, diorites, gabbros, basalts, etc. The metamorphic rocks included in these areas are phyllites, quart-

[1] With Hans Lundberg, Ltd., Toronto, Canada, but formerly consulting geophysicist to the Brazilian department of mineral production.

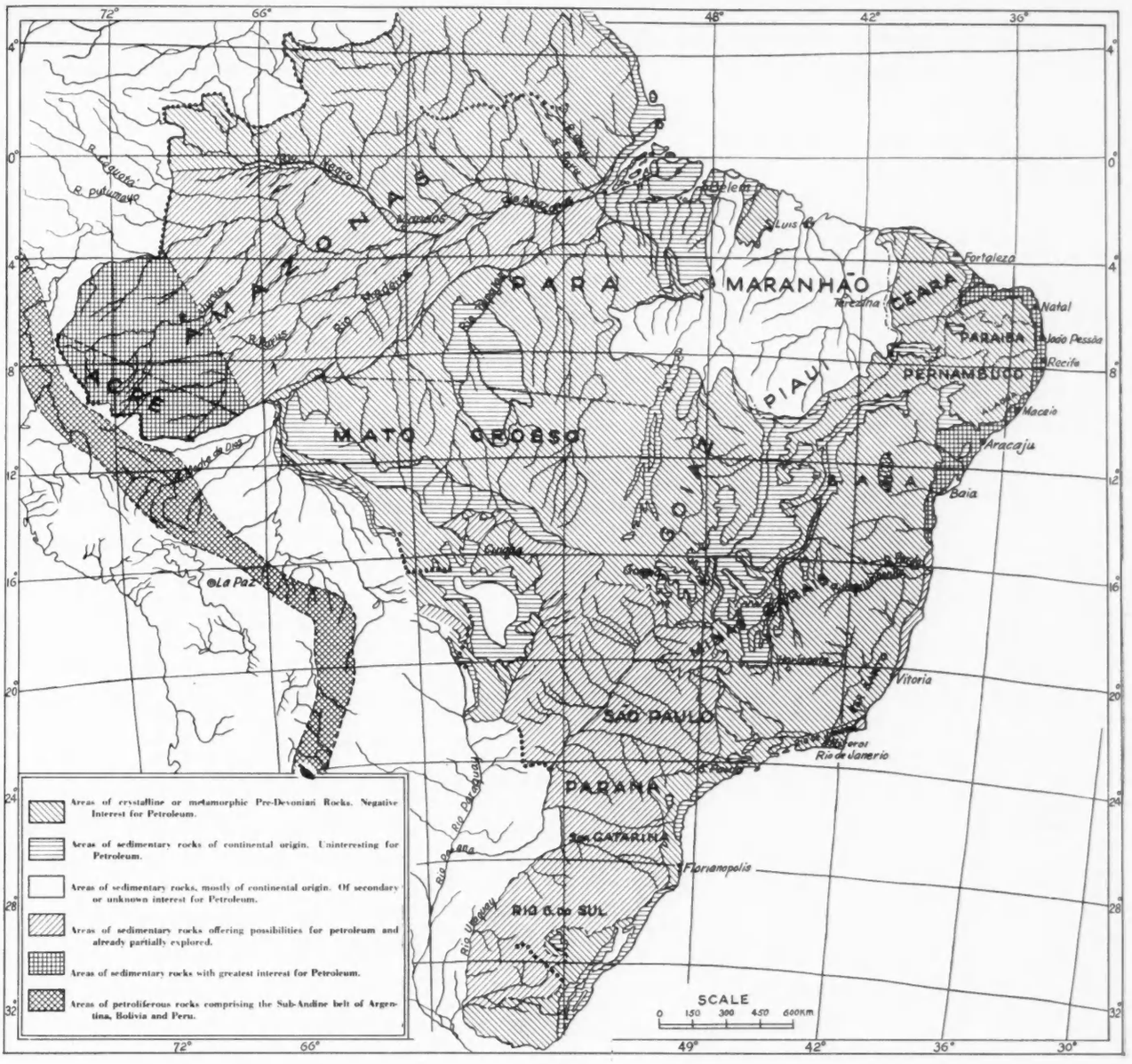


FIGURE 1
Sketch map showing geologic possibilities for the existence of petroleum in Brazil.

zites, mica-schists, itabirites, etc., of ages varying from Algonkian to Silurian.

Source of Sediments

The erosion of these ancient land masses has furnished most of the material for the sedimentary formations which have been deposited in the remaining portions of Brazil as well as in the neighboring countries.

Included in, or bordering on, these areas of crystalline and metamorphic rocks, the map shows several relatively large areas covered with cretaceous, tertiary and quarternary rocks of continental origin. In the light of present knowledge relative to the characteristics of these rocks, the government geologists tentatively classify them as having no particular interest for the petroleum geologist.

A large area in the states of Maranhao and Piaui and a smaller area in the state of Matto Grosso are classified as of secondary or unknown interest to the petroleum geologist. The surface rocks of these areas are of continental origin and uninteresting, but nothing is known as to what formations might be found below the surface.

Rocks of Marine Origin

Our next classification includes those areas of sedimentary rocks of marine origin, at least in part, which, for reasons to be discussed later, are believed to offer some possibilities for the existence of petroleum. They include the Brazilian portion of the basin of the Parana River, the greater part of the immense Amazon Valley, and a narrow strip along the coast of the states of Espirito Santo and Bahia.

The final classification includes those areas which are believed to offer the greatest possibilities for the discovery of petroleum in commercial quantities.

FIG. 2
Map showing Geophysical results in São Pedro-Xarqueada Area, State of São Paulo.
N.M.
SÃO PEDRO
XARQUEADA
G
H
NOTE
Magnetic Iso-anomalies in Z corrected for Latitude and D.V Gravity Gradients.
6
6

They are, first and most important, the Territory of Acre and the upper portion of the Amazon Valley and, second, a narrow strip along the northeastern coast from the state of Bahia to that of Rio Grande do Norte. Some details relative to these areas will be given in later sections of this article.

Dr. Oliveira has calculated the superficial area of these various regions and arrived at the figures given below.

TABLE I

Superficial Areas of Regions Indicated on Map of Fig. 1.

Description of Regions	Area in Sq. Kms.	Percent
Regions showing most promise	492,650	5.7
Regions offering possibilities	2,335,850	27.4
Sedimentary areas of unknown interest	934,250	10.9
Sedimentary areas of continental origin	1,132,251	13.3
Regions of crystalline and metamorphic rock	3,630,116	42.7
Total	8,525,117	100.0

Adding the figures for the first two classifications, we have a total area of 2,828,500 square kilometers (approximately one million square miles) or one-third of the total area of Brazil as offering some possibilities for the existence of petroleum.

Brazil is slightly larger than continental United States and an analysis of the surface geology of the latter country would give figures of the same order of magnitude as those presented in the table above. As a matter of fact, the total area of producing fields in the United States is approximately 0.5 percent of the total superficial area of the country.

Selected Areas

It is obvious that the routine prospecting of areas as large as those described represents a tremendous undertaking, one that can only be realized with the expenditure of very considerable sums over a period of years. Realizing that they do not possess the financial resources and technical personnel necessary to carry out extensive field campaigns in all of the interesting areas, the government officials have wisely decided to restrict their activities to a few of the more promising regions, at least for the present.

The areas selected for these prospecting campaigns are the following:

(1.) The Territory of the Acre in the region of the upper Jurua River; (2.) The coastal area from Bahia to Rio Grande do Norte; (3.) The sedimentary belt in the Parana basin in the states of Sao Paulo, Parana and Santa Catharina.

A more detailed description of these areas, as well as others believed to be worthy of attention, will be found in another part of this article.

B.—PROSPECTING HISTORY

The first attempts at discovering petroleum in Brazil by drilling were made during the last decade of the nineteenth century, first by individuals and small local companies, and later by the government of the state of Sao Paulo. Some years later, when the American geologist Dr. I. C. White headed the Brazilian Coal Commission (1906-07), he was requested to give an opinion relative to the prospects for the discovery of petroleum in the state of Sao Paulo. White declared that the general occurrence of basic igneous rocks in the sedimentary formations of the Parana basin made the region unfavorable for the existence of petroleum and drilling in that region was temporarily abandoned.

Drilling Resumed in 1918

In 1907 the Servico Geologico e Mineralogico do Brasil was organized under the direction of the American Geologist Dr. Orville A. Derby and the systematic study of the geology of Brazil was begun. Toward the close of the World War in 1918 attention was once more directed to the search for petroleum and a special commission headed by Dr. Euzebio P. de Oliveira, present director of the Servico Geologico e Mineralogico, was formed to investigate those areas where it was believed that petroleum might xeist. On the basis of the report of this commission, drilling was resumed and was continued almost without interruption for the next 15 years.

In 1927 the government of the state of Sao Paulo once more took up the search for petroleum in that state. Several new rigs were purchased and the American geologist Chester W. Washburn was contracted to make a study of the petroleum geology of the state. Drilling continued until the latter part of 1930 when it was interrupted as a result of the revolution of that year and has only recently been resumed once more.

Local petroleum companies were also organized in this state and began drilling at several localities, while still another private company was organized and began drilling in the state of Alagoas.

Geophysical Section Organized

The geophysical section of the Servico Geologico e Mineralogico do Brasil was organized under the direction of the author in 1932 and during the ensuing five years, reconnaissance and semi-detailed geophysical surveys were carried out in the states of Santa Catharina, Parana, Sao Paulo, Alagoas and Bahia.

In 1933 the Departamento Nacional de Produccao Mineral was created and all prospecting work was turned over to the Servico de Fomento da Produccao Mineral, a sub-division of the Department. Since that time the work of the older Servico Geologico e Mineralogico, also a sub-division of the department, has been restricted to studies of pure geology, although members of the staff of both organizations work in close co-operation and harmony.

During the last 20 years, over 100 tests have been drilled in the search for petroleum and coal. These tests have been distributed in accordance with the following table:

TABLE II

Tests for Petroleum and Coal which have been drilled in Brazil.

STATE	NUMBER OF TESTS DRILLED BY			Tests Drilled for Coal, Federal Government
	Federal Government	State Government	Private Companies	
Sao Paulo	22	4	5	..
Parana	12	..	2 (?)	7
Para	10	..	..	..
Alagoas	6	..	2	..
Bahia	6	..	..	..
Santa Catharina	6	..	..	8
Rio Grande do Sul	2	..	..	8
Amazonas	..	..	..	5
Piauhy	..	..	..	3
Total	64	4	9 (?)	31

The deepest test drilled in Brazil was in the Sao Pedro area in the state of Sao Paulo and reached an approximate depth of 5000 feet. Only one other test,

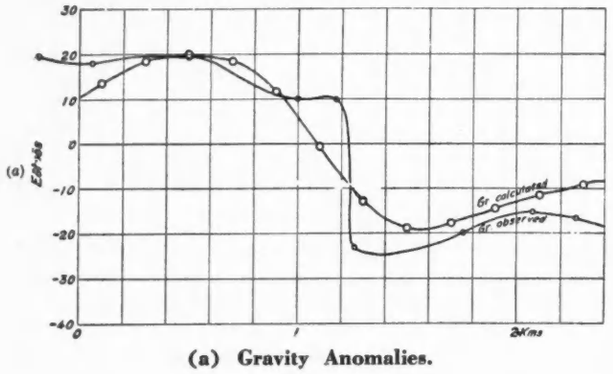
also in the Sao Pedro area, has been drilled to a depth in excess of 3000 feet. The average depth for all tests drilled in the state of Sao Paulo is approximately 1500 feet, while the average for all tests drilled in Brazil, including those drilled in the search for coal, is probably less than 1200 feet.

Four Rigs Active

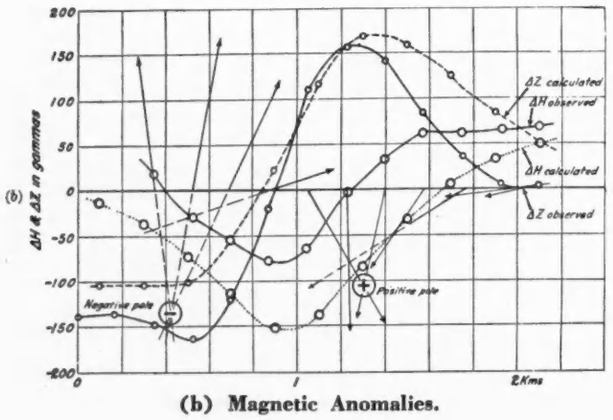
Out of a total of 77 wells drilled in the search for petroleum, 53 were located in the Permo-Triassic belt of the states of Sao Paulo, Parana, Santa Catharina and Rio Grande do Sul and 10 in the Lower Amazon Valley, both regions considered as offering some possibilities, while the remaining 14 tests were drilled in the coastal region of the states of Bahia and Alagoas, a region considered as being more favorable. At the present time four rigs are reported as active, one each in the states of Bahia, Alagoas and Para and one in the Territory of Acre. Another rig is being mounted in the Acre. Comments on the results of these various tests will be found in our discussion of these various areas.

FIGURE 2-A

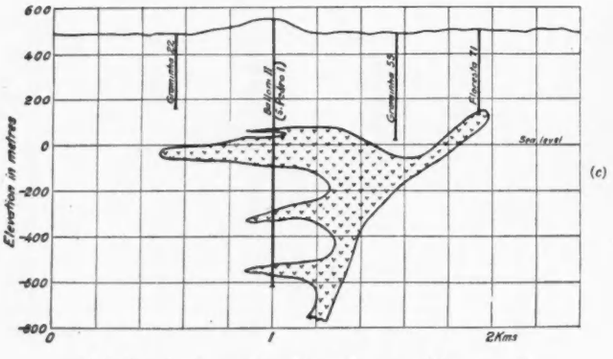
Observed and calculated anomalies over Diabase Lacolith in Co-ordinates G6, H6 (Figure 2) in Sao Pedro area.



(a) Gravity Anomalies.



(b) Magnetic Anomalies.



(c) Geologic section based on well logs and geophysical data.

C.—PERMO-TRIASSIC BELT OF SOUTHERN BRAZIL

Although the Permo-Triassic belt of southern Brazil is not now considered as offering the best chances for the discovery of petroleum in Brazil, past exploratory efforts have largely been concentrated here and it will therefore be discussed first.

The Santa Catharina System, sometimes referred to as the Gondwana Rocks, rests nonconformably on the crystalline and metamorphic rocks of the Brazilian Complex, except in the state of Parana, where it rests on a well developed series of sandstones and shales of lower Devonian age. This system was first studied by I. C. White and later by Euzebio de Oliveira, L. F. de Moraes Rego, Chester W. Washburn, A. du Toit and V. E. Oppenheim, as well as by other geologists of the federal and Sao Paulo geological surveys.

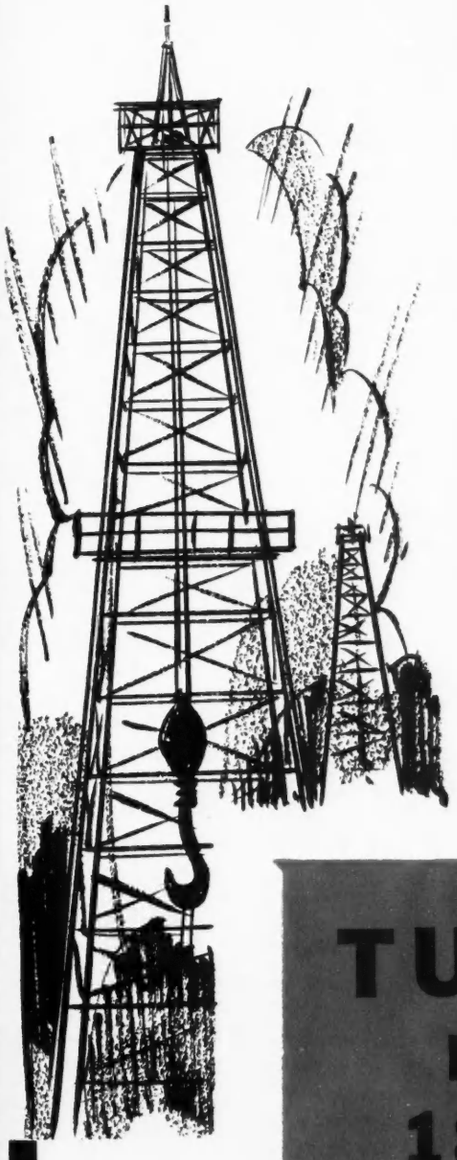
Igneous Intrusions

The base of the Santa Catharina System is the Itarare Series of fluvio-glacial origin and lower Permian age. This is followed by the coal bearing Tubarao Series, source of the bituminous coal mined in the states of Rio Grande do Sul and Santa Catharina. The upper Permian is represented by the Passa Dois Series sub-divided into the bituminous Iraty shales and the Estrada Nova sandstones and shales which are at least partly of marine origin. The Triassic is represented by the Sao Bento Series, subdivided into the Rio do Rasto Beds and the Botucatu Sandstones followed by (in Sao Paulo) the Caiua Sandstones. During the late Triassic or Rhaetic time, the region was subjected to intensive igneous activity; tremendous lava flows poured over the western part, while the eastern part suffered igneous intrusions in the form of dikes, lacoliths, sills, etc.

The regional dip of the Santa Catharina System is westward, varying slightly to the north and south in certain areas. There is little or no evidence of

C.P.B. well at Sao Pedro, State of Sao Paulo.

11th INTERNATIONAL PETROLEUM EXPOSITION



The 1938 International Petroleum Exposition was indeed a great oil show—by far the largest, best and most widely attended in history—truly, the greatest exposition in the world devoted to a single industry.

For this outstanding success, we are indebted to the manufacturers, distributors and supply companies serving the petroleum industry, and to the oil fraternity for its record-breaking attendance.

It took courage and faith to execute the $150,000.00 expansion and improvement program which gave the 1938 show fifty per cent additional exhibit space; the new restaurant; administration building; Hall of Science and many other new and enlarged facilities and services so essential to the satisfactory handling of the show.

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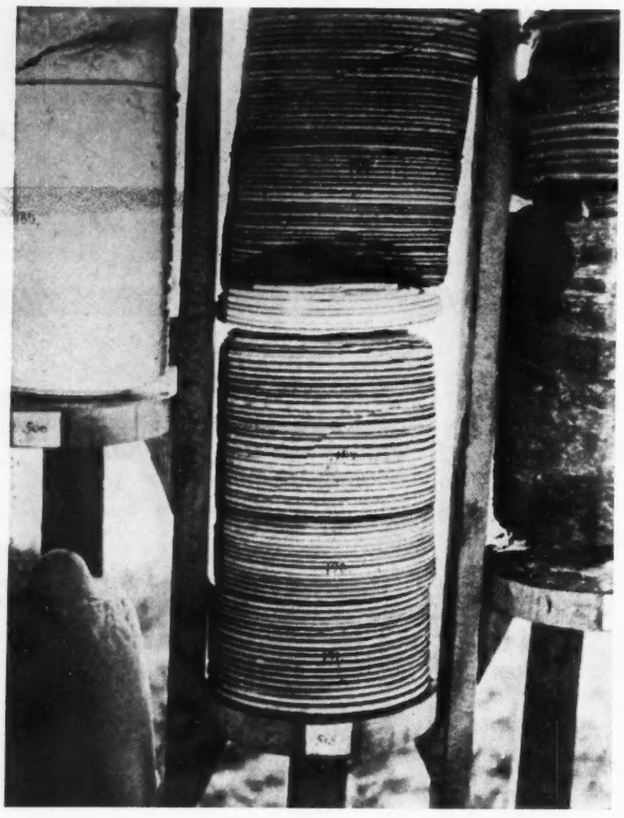


Cores of glacial tillite from C.P.B. well at Sao Pedro, Sao Paulo.

post-Devonian structural deformations, other than those due to minor faulting and to the effect of the igneous intrusives.

Washburn's Hypothesis Supported

Drilling was first begun in this region because it was believed that the bituminous Iraty shales would prove to be adequate source beds. Consequently, many of the tests were abandoned after drilling through this formation. Later, Washburn suggested that Devonian source beds, similar to those found in Bolivia and north Argentina, might be found below the Itararé glacial formation, and subsequent wells were drilled somewhat deeper, but none of them succeeded in passing through the entire thickness of the Itararé.

Nothing of interest was found in the post-Itararé sediments but some shows of oil and gas were found in several wells in the Itararé itself. These shows, coupled with the production of petroleum from the equivalent glacial series of North Argentina, lend credence to the hypothesis of Washburn.

Additional support is found in the results obtained in various geophysical surveys. These indicate the possible existence of a greater thickness for the sedimentary column than can well be accounted for by the presumed maximum thicknesses of the various members of the Santa Catharina System, thus permitting us to postulate the presence of pre-Itararé sediments of unknown character.

Could Apply Geophysics

Prospecting in this region presents considerable technical difficulties. Structures observed on the surface are more likely to represent uplifts resulting from igneous intrusions in the form of laccoliths and not true anticlinal structures. The presence of such intrusions can be detected by the magnetometer and confirmed by the gravity meter or torsion balance, where the topography permits the use of the latter instrument.

The map of Figure 2 represents graphically the results of a combined magnetometer-torsion balance survey of the Sao Pedro area in the state of Sao Paulo. The magnetic and gravimetric anomalies represent igneous intrusions, the presence of which are proven by the logs of the numerous tests drilled in this area, several of which were located on surface indications of structural uplift, which have been proved to represent the effects of the igneous intrusions. The negative results of these tests proves the inadequacy of the Iraty as a source bed in this particular area, and the presence of the intrusive masses make it almost impossible to expect any geophysical method to deliniate accurately the structure of the pre-Itararé formations which perchance might exist.

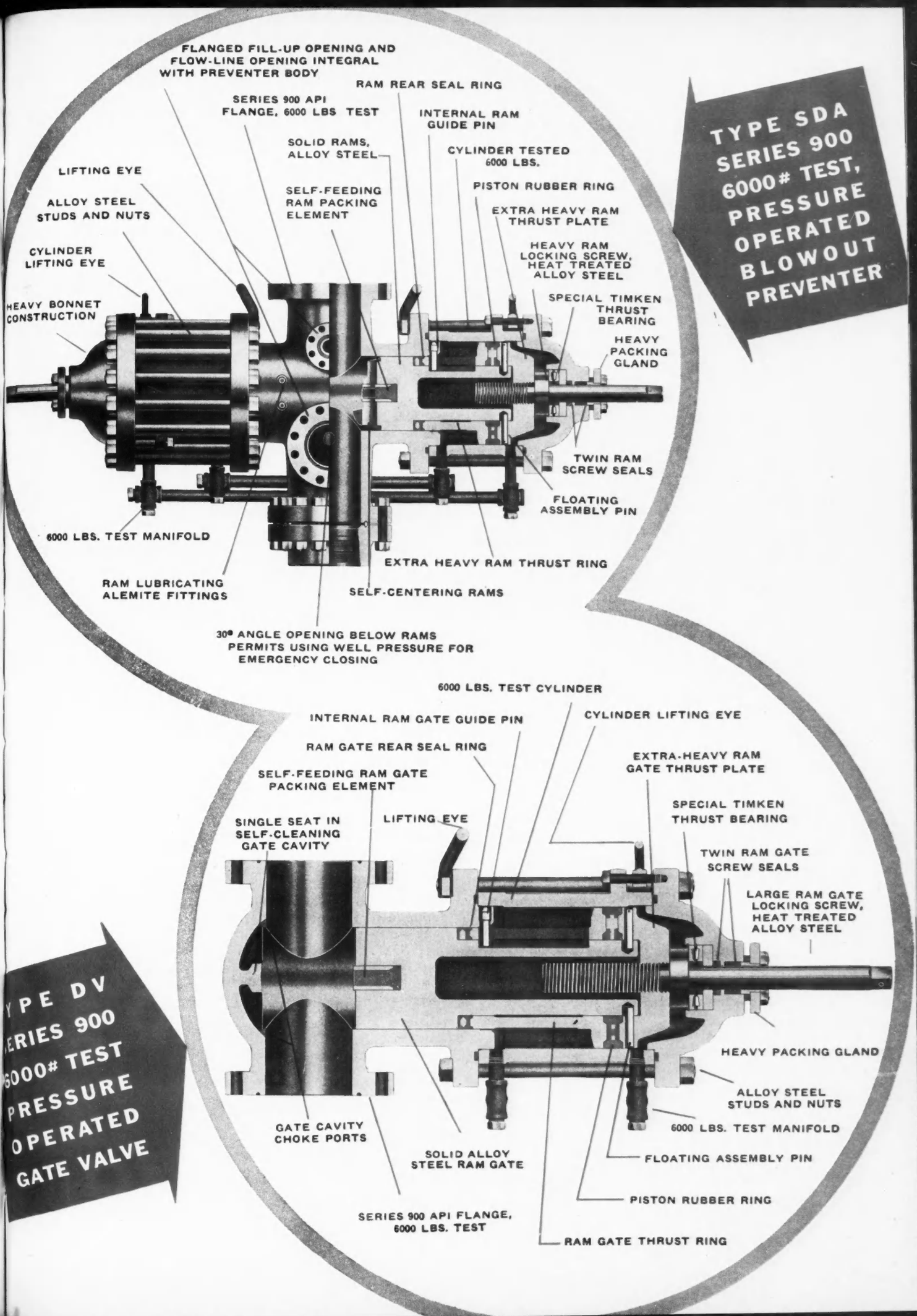
Mapping Problems

Assuming that the reflection seismograph, when carefully applied in combination with the magnetic and gravimetric methods, might prove its ability to map the top of the formation underlying the Itararé glacial beds, our problem is still far from being solved. The topography of a region which has been subjected to intensive glaciation will show deeply gouged valleys and rounded hills and, if we should map the surface of such a buried topography, our maps would not necessarily bear any resemblance to the structure of such formations as might underlie the glacial sediments. If the seismic reflection method is to be successful in this region, it must map a reflecting horizon well below the eroded surface of the pre-glacial formations, and must eliminate the effect of the Triassic igneous intrusions so common to the region.

Expenditures Warranted.

Successful prospecting may only be hoped for after a considerable amount of experimental geophysical work has been completed and the results correlated with the logs of experimental tests drilled into the crystalline complex, if possible, in carefully selected areas. The nearness of this region to the principal centers of consumption, as well as its political and economic importance to the nation, warrants the expenditure of considerable sums in the attempt to solve the problem of the existence of petroleum. However, it must be admitted that the solution is difficult and the possibilities none too great.

Part 2 of this article will be published in an early issue.


FLANGED FILL-UP OPENING AND FLOW-LINE OPENING INTEGRAL WITH PREVENTER BODY
RAM REAR SEAL RING
SERIES 900 API FLANGE, 6000 LBS TEST
INTERNAL RAM GUIDE PIN
SOLID RAMS, ALLOY STEEL
CYLINDER TESTED 6000 LBS.
LIFTING EYE
SELF-FEEDING RAM PACKING ELEMENT
PISTON RUBBER RING
ALLOY STEEL STUDS AND NUTS
EXTRA HEAVY RAM THRUST PLATE
HEAVY RAM LOCKING SCREW, HEAT TREATED ALLOY STEEL
CYLINDER LIFTING EYE
SPECIAL TIMKEN THRUST BEARING
HEAVY BONNET CONSTRUCTION
HEAVY PACKING GLAND
TWIN RAM SCREW SEALS
FLOATING ASSEMBLY PIN
6000 LBS. TEST MANIFOLD
EXTRA HEAVY RAM THRUST RING
RAM LUBRICATING ALEMITE FITTINGS
SELF-CENTERING RAMS
30° ANGLE OPENING BELOW RAMS PERMITS USING WELL PRESSURE FOR EMERGENCY CLOSING
6000 LBS. TEST CYLINDER
INTERNAL RAM GATE GUIDE PIN
CYLINDER LIFTING EYE
RAM GATE REAR SEAL RING
EXTRA-HEAVY RAM GATE THRUST PLATE
SELF-FEEDING RAM GATE PACKING ELEMENT
SPECIAL TIMKEN THRUST BEARING
SINGLE SEAT IN SELF-CLEANING GATE CAVITY
LIFTING EYE
TWIN RAM GATE SCREW SEALS
LARGE RAM GATE LOCKING SCREW, HEAT TREATED ALLOY STEEL
HEAVY PACKING GLAND
ALLOY STEEL STUDS AND NUTS
GATE CAVITY CHOKE PORTS
6000 LBS. TEST MANIFOLD
SOLID ALLOY STEEL RAM GATE
FLOATING ASSEMBLY PIN
PISTON RUBBER RING
SERIES 900 API FLANGE, 6000 LBS. TEST
RAM GATE THRUST RING

TYPE SDA SERIES 900 6000# TEST, PRESSURE OPERATED BLOWOUT PREVENTER

TYPE DV SERIES 900 6000# TEST PRESSURE OPERATED GATE VALVE

Employee Morale Profitable On De Mares Concession

Wholesome working conditions have created high morale among Tropical Oil employees

By WM. V. GROSS, Foreign Editor

NESTLED in the valley of the Magdalena River and hemmed in by mountains is the jungle-covered De Mares concession, a spread of 534,000 hectares 395 miles south of Colombia's seaport of Barranquilla. It offers two interesting studies to the man concerned about the history and progress of South American oil development. Those two studies might be designated: "Rational, Profitable Oil Concession Development" and "Mutual Benefits to Employer and Employee of Properly Organized and Conducted Industrial Relations."

Welfare Relation to Output

A visit to the Barranca Bermeja, river terminal of the De Mares concession, and to El Centro, field operating headquarters for La Cira and Infantas fields of Tropical Oil Company, leaves the impression that that organization has reached the practical conclusion that better working conditions mean better working results from employees. It seems to have gone as far as it can for its men without being foolish—and what is more vital—the men seem to have absorbed the idea that the company has done exactly that.

Morale High

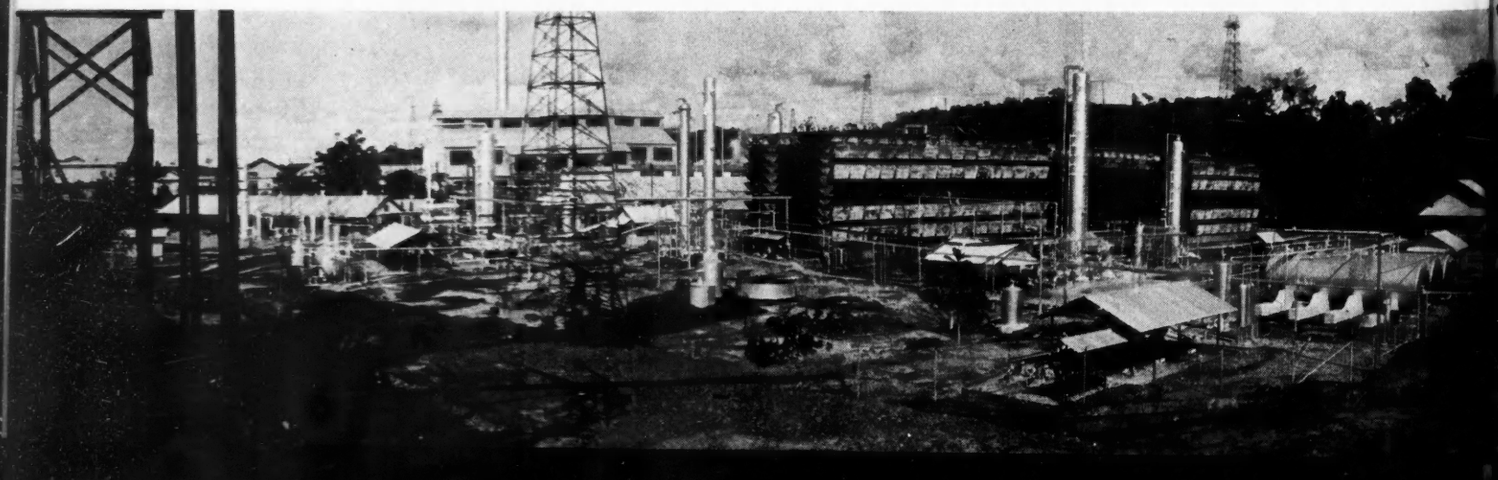
When a visitor can sit with field men—not office men—in a company mess hall, listening to their unrestrained chatter on this and that subject for five days, and not hear a single bit of serious bellyaching against management, food or living conditions, he has run into something bordering the miraculous. Not exactly that condition exists at El Centro, but it comes so very, very close to it that even a critical professor would have to grade employee morale among Tropical men at 99 plus, with the points marring an otherwise perfect record attributable largely to bollweevils who have just arrived, those who expect the impracticable, if not the impossible.

Inasmuch as oil companies of the larger type find themselves increasingly concerned with development of reserves in countries speaking languages different from their own, a brief explanation of just how "Troco," that's the name by which the company is known in Colombia, has gone about creating such a wholesome condition and making the men like their work is given.

Good Food Put First

First of all—and this comes from the Colombians as well as from the foreigners who draw their livings from the company coffers—the men in the organization are sold on this notion: That the company assumes—whether it be engaged in the very first of preliminary exploration work or in the final phase of putting finished petroleum products into containers—that the prime requisite of success is in a properly conducted and supplied mess hall. And it is well to observe in this connection that it is the opinion of the men—the workers—which is important to the company in this respect—far more im-

Gas from the field is compressed to 40 pounds for low pressure compressors, thence to absorbers. Lean oil absorbs the gasoline. The remaining gas is recompressed and used for repressuring.



THE WORLD'S DEEP, HIGH-PRESSURE WELLS ARE NOW BEING DRILLED AND COMPLETED THROUGH

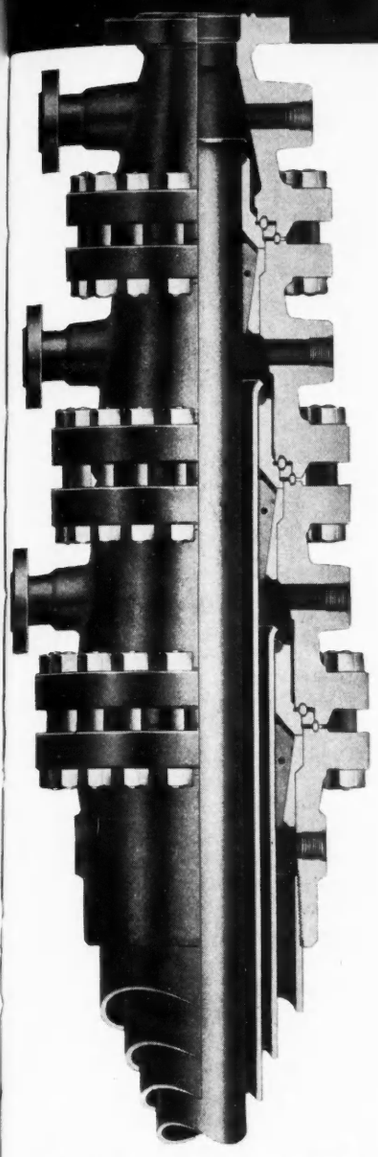


Illustration above shows a 16" x 13⅜" x 9⅝" x 7" Cameron Casing Head Hook-Up, utilizing Cameron Type "C" Slip-Suspension Hanger. A Cameron "Boll-Weevil" Type Tubing Head is flanged above.

CAMERON ALL-STEEL CASING HEADS

WITH THE UNIQUE "FLEX-STEEL" MULTI-RING GASKET ASSEMBLY

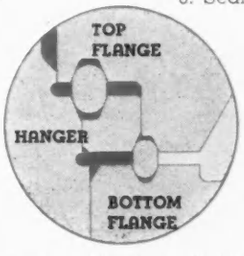
EMPLOYING an entirely new means of seal and hold-down which eliminates resilient packings, and embodying a number of exclusive features that provide a high degree of safety, flexibility and efficiency, Cameron All-Steel Casing Heads and Spools have demonstrated their superiority on a large number of deep, high-pressure wells during the past year.

SPECIFIC ADVANTAGES OF DESIGN AND CONSTRUCTION

1. Leak-proof seal between flanges and casing strings accomplished by Flex-Steel Multi-Ring Gasket Assembly. Compression of steel seal rings controlled by outside flange studs. Flex-Steel Gaskets hold down casing hanger assembly rigidly.

2. Five methods of casing suspension available, all with Flex-Steel Multi-Ring Gasket Assembly: Slip type hanger, standard threaded hanger, Santa Fe coupling hanger, a welding type hanger and a slip type hanger with neoprene lip seal ring and packer rubber to effect annular space seal as soon as pipe is suspended.

3. Split Slip-Bowl and Split Slip assemblies easily engaged around casing string on derrick floor and passed through blowout preventer hook-ups. Auxiliary Welding Hanger, installed after casing has been suspended, prevents casing string from settling in slips and swaging.



Cameron Flex-Steel Multi-Ring Gasket Assembly, which provides an all-steel sealing and hold-down means.

4. Slip suspension permits landing casing at any point in hole without releasing tension in string, or setting weight of string on bottom while cutting nipple, etc.

5. 45° beveled seat in casing head serves as support for slip-bowl only—no seal being effected at this point. Mis-alignment or "cocking" of slip bowl, due to bit scars on tapered seat in head, is compensated by mis-aligning feature of Flex-Steel Gasket Assembly.

6. Sealing of annular spaces between strings is accomplished on polished steel surfaces applied at moment of completing casing suspension operation. Standard A. P. I. ring groove between flanges is constantly protected by a steel ring gasket.

7. Weight of casing string not utilized to effect seal.

8. All-flanged construction eliminates casing-size threads above surface pipe. All sizes are full opening.

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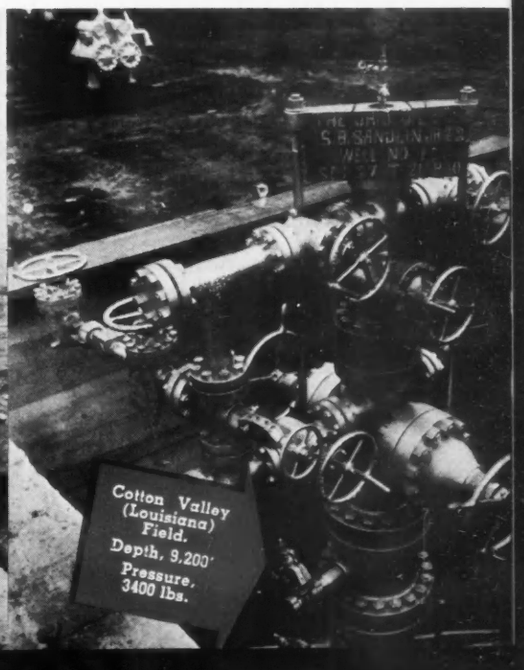
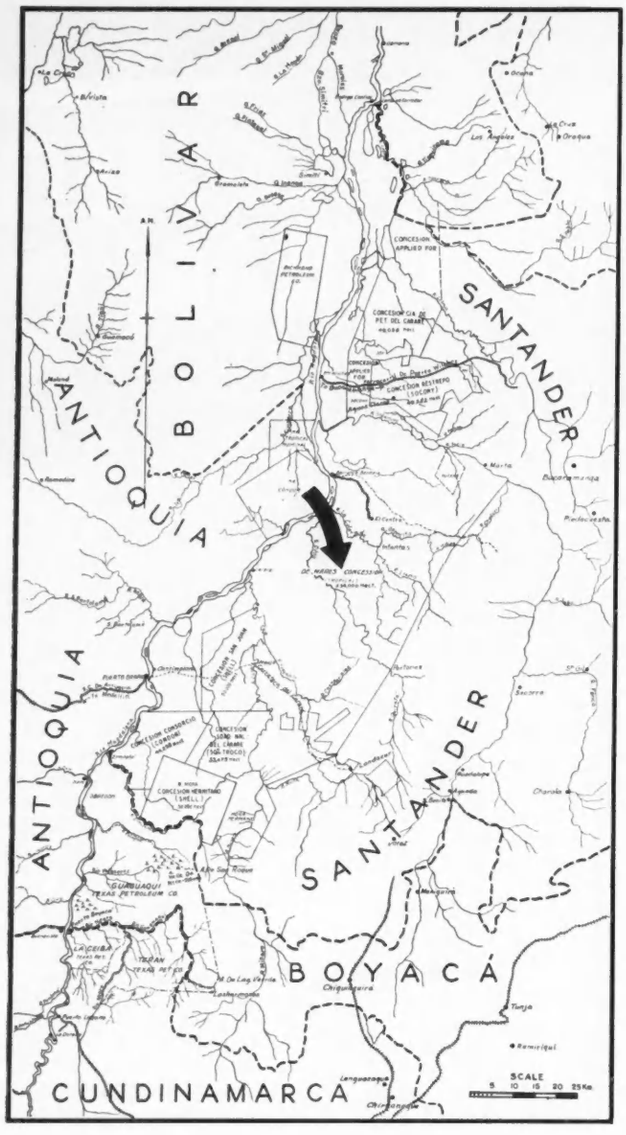




General map showing location of De Mares concession with reference to other concessions held in the Magdalena River valley of Colombia. The country's two oldest fields, Infantas and La Cira, are located within the concession. El Centro designates headquarters from which they are operated.

portant than the opinion of the executives. What the executives think doesn't amount to a hill of beans if the men are not satisfied.

Troco executives in Colombia seem to have been able to anticipate what would be necessary to mould such an opinion, and they have obtained the necessary for the men and still managed through increased efficiency of the men to make money and to keep employee welfare expenditures fairly close to a sensible figure.

Housing Comes Second

Second, considering the wage scale or salary of an individual employee at El Centro or Barranca Bermeja, that employee will be found to be housed in a manner a bit better than his income might indicate. The idea (and you can't stay in El Centro for a while without getting "hepped" on this industrial relations business) seems to be that if the company does just a bit more than it might be forced to do for the employee the reward will come with better morale. Not a few outsiders have observed that this bread cast upon the waters floats back in, regularly, with each tide.

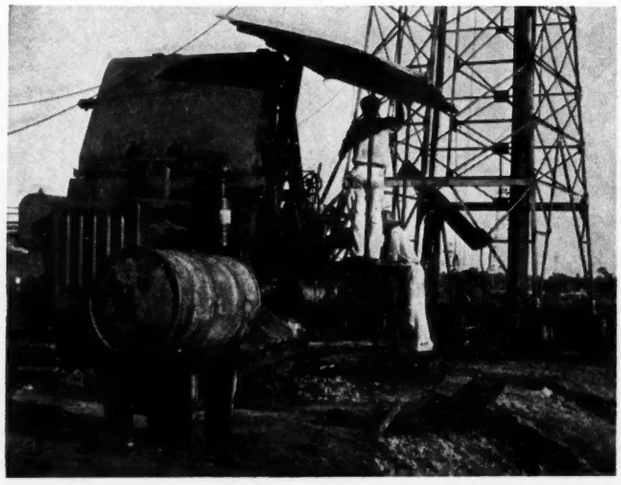
The foregoing does not mean to infer that Troco has forever been free of all labor disturbances. As long as the company has enough drive to it to keep the government convinced from revenue receipts of various kinds that it is really trying to develop the De Mares concession in a businesslike manner to the mutual benefit of the government and the company, it cannot expect to be entirely immune to minor labor ailments.

Committee For Complaints

And right there is another thing in which Troco has been wise. The workers—whether skilled or unskilled—have a board or committee of their own to which they can voice complaints. If the board thinks there is anything to the complaint, or demand, it meets with representatives of the company. Here, efforts are directed at a practical solution of the particular problem involved and not at the perfection of that type of oratory resorted to in haggling. Such a scheme calls for an appreciation by the workers' representative of the company's objective in business and its financial limitations. On the part of the company's representative, it calls for an intimate knowledge of and sympathy with the worker's living and working conditions—it calls for him to have that quality of being somewhat of a humanitarian without carrying that quality to a foolish extreme that would eventually wreck both employer and employee, just as a too pampered and spoiled boy often turns out in manhood to be not much good to himself or to anyone else. The scheme may be all wet, but it produces workable results—not stalemates.

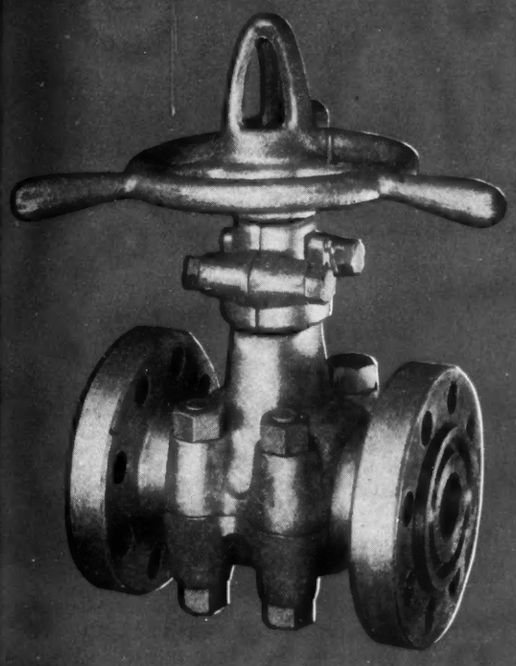
General Welfare Items

Doing just a little bit more than demanded for the employee was spoken of a while back. Under this



One of the several types of outfits used for servicing wells in La Cira and Infantas fields of Tropical Oil Company.

CAMERON *Flex-Seal* MUD VALVE



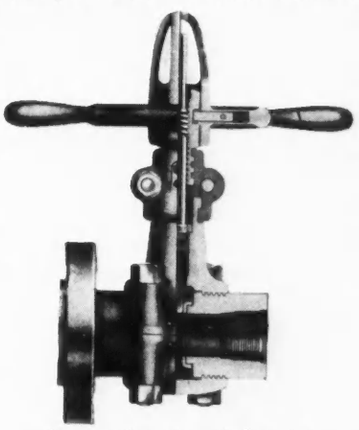
Saves 93%

MAINTENANCE COST IN SLUSH PUMP RELIEF SERVICE!

Here are the maintenance cost facts developed on a recent test of various types of slush pump relief valves at Old Ocean Field, Brazoria County, Texas. The test was conducted on three rigs engaged in drilling wells to an average depth of 10,250 feet, and covered a period required for each rig to drill five wells. Drilling time was approximately 60 days per well.

A Cameron 2" Flex-Seal Mud Valve on the pump relief outlet of one rig completed five wells without repair cost, although at the completion of the fifth well repair costs were $6.70, including one Gate Packer at $5.50 and two Wear Rings at $1.20 per pair.

Various other types of valves recommended for Pump Relief Service were tested on the other two rigs at the same time the Cameron Flex-Seal Mud Valve was being tested. The average life of other types of valves tested was one well. The average repair cost on these other types of relief valves was $25.



Cross-section view of Cameron Renewable Flex-Seal Mud Valve, showing gate in full open position. Its unique design permits changing resilient inserts, quickly and at low cost, in the field.

Practical well men the world over agree that Slush Pump Relief Valve Service is the toughest valve job around a drilling rig. The proven fact that a Cameron Flex-Seal Mud Valve can be operated at 93% lower maintenance cost than any conventional type of valve available for this service should command the interest of all who are responsible for the purchase of mud manifold valves.

A special illustrated bulletin providing full mechanical details of design and construction, and full dimensional and price data, will gladly be forwarded on request to any interested operator. Available in 2", 3", and 4" sizes — 6000 lbs. test.

CAMERON IRON WORKS, INC. 711 MILBY ST., HOUSTON, TEXAS

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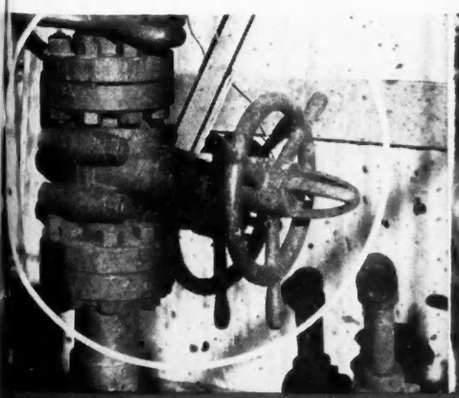
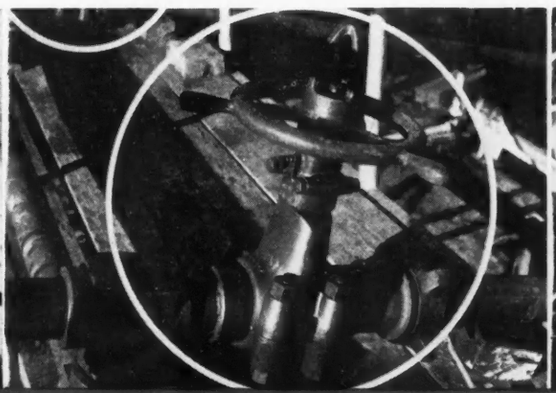
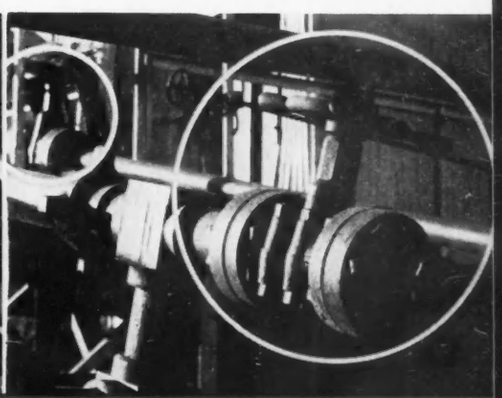


Cameron 4" Flanged End Renewable Flex-Seal Mud Valve on a standpipe in the Old Ocean Field.



A Cameron 4" Screwed End Renewable Flex-Seal Mud Valve on a mud manifold in the Old Ocean Field

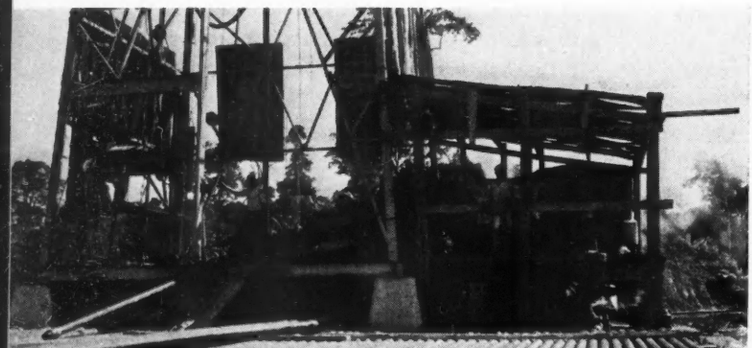


Two Cameron 2" Flanged End Renewable Flex-Seal Mud Valves on a mud manifold in the Old Ocean Field.

heading one might put the Club Union erected for Colombians at El Centro by Troco. It's a club in the highest sense of the word and offers the men—and their families—a sight more in the way of privileges than the average city club in the United States. And then there is the Club International in the same place, and the club in Barranca Bermeja. Picture shows, tennis courts, swimming pools, orderly conducted bars, golf courses, billiard and pool rooms, libraries, ladies lounges and tea rooms, water purifying plants, a factory which periodically renovates all mattresses, laundries, an excellent hospital, cold storage plant to assure decent meats and well preserved vegetables et cetera for all, free transportation into and out of town—all these and more besides Troco has provided bit by bit since work started on the concession back in the days when everybody was praying that the World War would hurry to an end. The function of the company has been normally profitable, except during the depression, when it had to seriously curtail activity. And what large oil company did not?

Tropical Oil Company Operates Colombian Fields Efficiently

And what did the Tropical Oil Company get out of it? Well, to the end of 1937 the recovery from the two producing structures on the concession amounted to 205,605,000 barrels, and while the Infantas structure is completely drilled, it is pumping along at the decidedly worthwhile rate of 436,000 barrels per month (the November figure) and La Cira, which still has plenty of locations to be drilled, put 1,408,000 barrels in lease tanks in the same month.



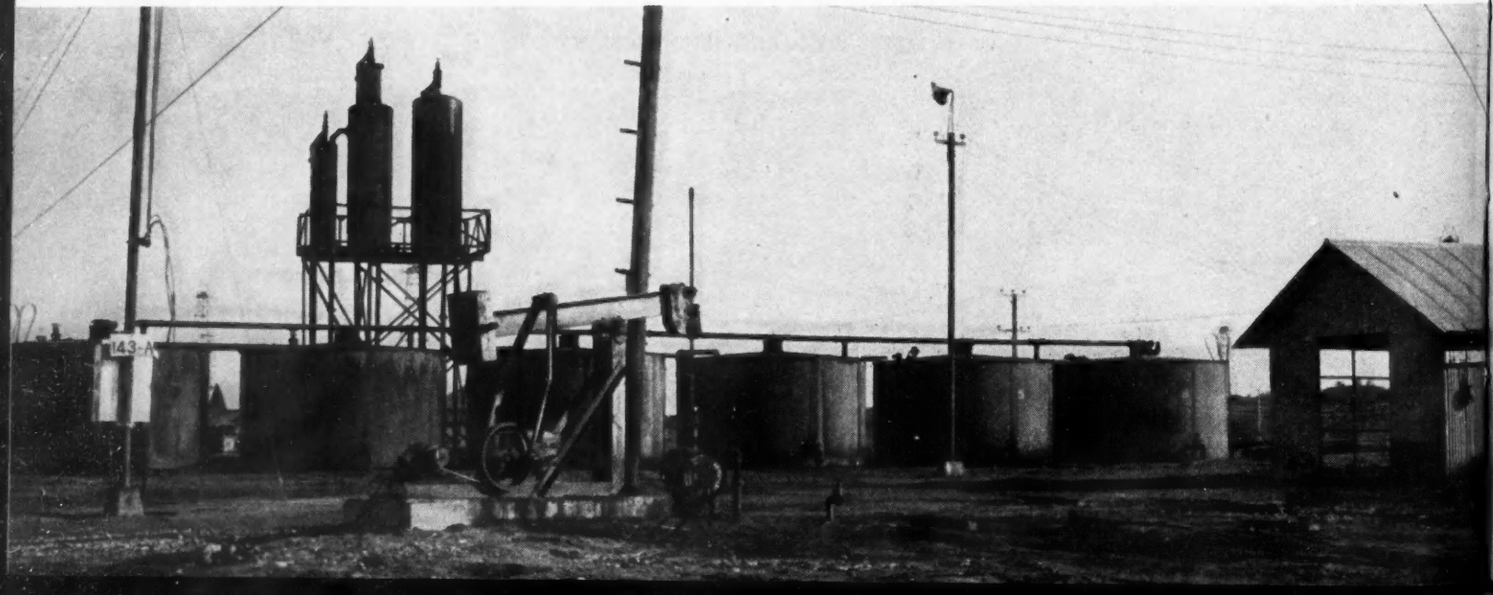
Because 1938 is probably the last year that the two fields within the De Mares concession will retain the honor of being the only producers in Colombia (Barco concession wells probably will be turned into the pipe line before 1939 is over) the history of La Cira and Infantas is put down here for record.

Abundant seepages and a strongly developed uplift caused the drilling of the first well, Infantas 2, which was completed April 29, 1918, for 150 barrels of 25 gravity oil. The well itself was named after the Infantas structure, an anticline or locality of seepages which had many years before been named in honor of two Spanish princesses.

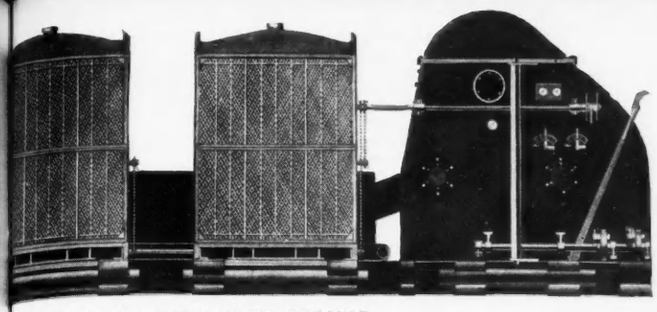
Geology of Two Fields

Taking the older of the two fields first, the geology of Infantas may be described as a faulted anticline of more or less normal type, that is, with the major faulting running its entire length and with a few

At top is the typical drilling rig used to develop the 3200-foot C zone at La Cira. Below is the battery of 250-barrel flow tanks and the separator hook-up in use at El Centro.

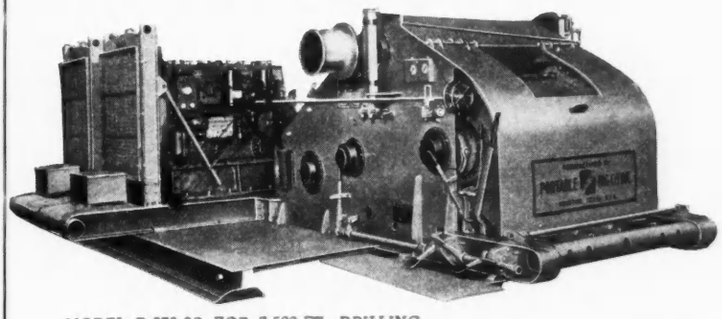


Portable Rigs



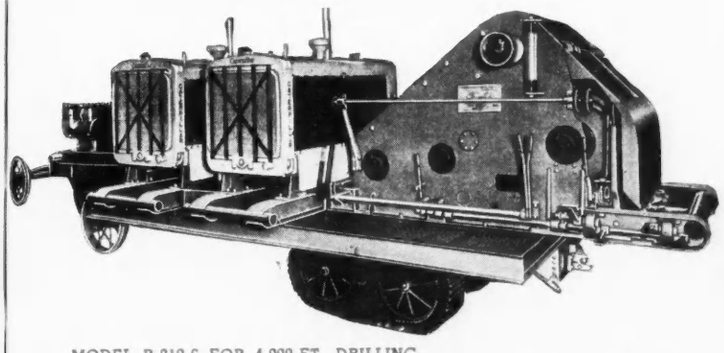
MODEL 1061 FOR 10,000-FT. DRILLING

Side view showing: Air control valves for clutches; oil pressure gauge; vacuum gauges for synchronizing engines; engine throttle, and brake lever. Skids under each engine and draw works for portability.



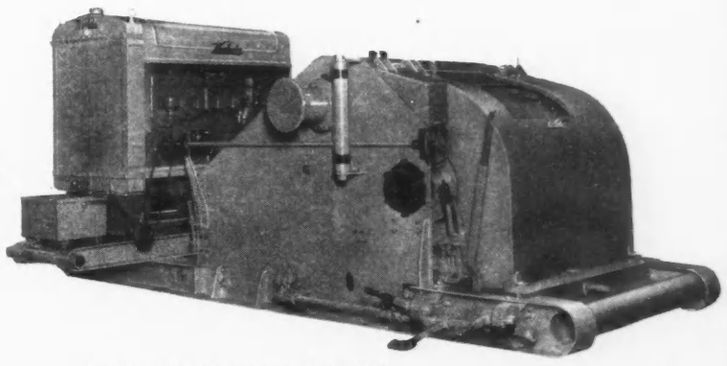
MODEL R-876-8A FOR 7,500-FT. DRILLING

Showing: centralized controls at driller's position; rig transported in three sections—draw works, engines, and substructures.



MODEL R-810-6 FOR 4,000-FT. DRILLING

Showing: Rig, two engines, and pump mounted on tractor wagon to illustrate its portability.

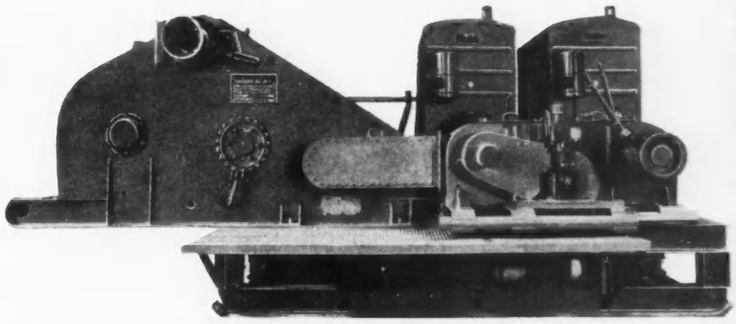


MODEL 35 FOR 3,000-FT. DRILLING

Showing: Rig with single engine drive (can also be furnished with dual engine drive). Can be mounted on substructure of any desired height, or mounted on truck for well servicing and drilling where moves are frequent.

GENERAL SPECIFICATIONS FOR THE ABOVE RIGS

	1061	R-876-8A	CT-5	R-810-6	35
Depth Recommended	10,000 Ft.	7,560 Ft.	5,000 Ft.	4,000 Ft.	3,000 Ft.
DRAW WORKS:					
Drum Shaft	9¼″	7⅝″	6¼″	5½″	4¾″
Line Shaft	7″	5″	4½″	3½″	3½″
Rotary Shaft	4½″	4½″	4¾″	4″	3½″
Brakes—Type	Water Cooled	Water Cooled	Water Cooled (Optional)	Water Cooled (Optional)	Conventional
Brake Width	10½″	10″	8″	8″	8″
Brake Drum Diameter	54″	40″	40″	36″	36″
Drum Spool Dimension	24″ x 44″	18″ x 30″	18″ x 30″	14″ x 26″	16″ x 26″
Drum Clutches	Friction	Friction	Friction	Friction	Friction
Speed on Drum	8 Forward 4 Reverse	8 Forward 6 Reverse	5 Forward 1 Reverse	6 Forward 4 Reverse	3 Forward 1 Reverse
Rotary Clutch	Friction	Friction	Friction	Friction	Friction
Speed on Rotary	8 Forward 4 Reverse	8 Forward 6 Reverse	4 Forward 2 Reverse	4 Forward 2 Reverse	3 Reverse 1 Reverse
Rig Height—Overall	6′ 4″	6′ 9″	5′ 0″	6′ 7″	4′ 7½″
Rig Length—Overall	8′ 0″	14′ 6″	13′ 0″	11′ 9 1/16″	10′ 0″
Width on Derrick Floor	20′ 0″	6′ 11″	6′ 7½″	8′ 0″	5′ 1½″
Weight	48,000 lbs.	25,000 lbs.	18,000 lbs.	14,000 lbs.	10,000 lbs.
DUAL ENGINE DRIVE:					
Shafts	5 1/16″	5 1/16″	5 1/16″	5 1/16″	4″
Lubrication	2 Oil Pumps	2 Oil Pumps	2 Oil Pumps	2 Oil Pumps	2 Oil Pumps
Skids	12″ H. Beam	8″ 40 lb. H. Beam	8″ 40 lb. H. Beam	8″ 40 lb. H. Beam	8″ 40 lb. H. Beam
Approximate Weight	10,000 lbs.	8,000 lbs.	7,000 lbs.	7,000 lbs.	4,200 lbs.
SUBSTRUCTURE: Substructure may be furnished on any rig at height desired by operator. Engines specification submitted on request.					
Bulletin Number	1061	876	CT-5	39	35



MODEL CT-5 FOR 5,000-FT. DRILLING

Showing: Rotary drive sprocket; V-belt pulley for pump drive; air compressor; and enclosed oil bath dual engine drive, type used on all enclosed rigs using two engines.

NOTE: Pump Drives vary with make and size of pump and engine speed. All capacities are based on 4½-16.6 lb. drill pipe with tool joints.

MAIN OFFICE AND PLANT
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PORTABLE RIG COMPANY INC.

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NEW YORK
CODE—"PORTRIG"

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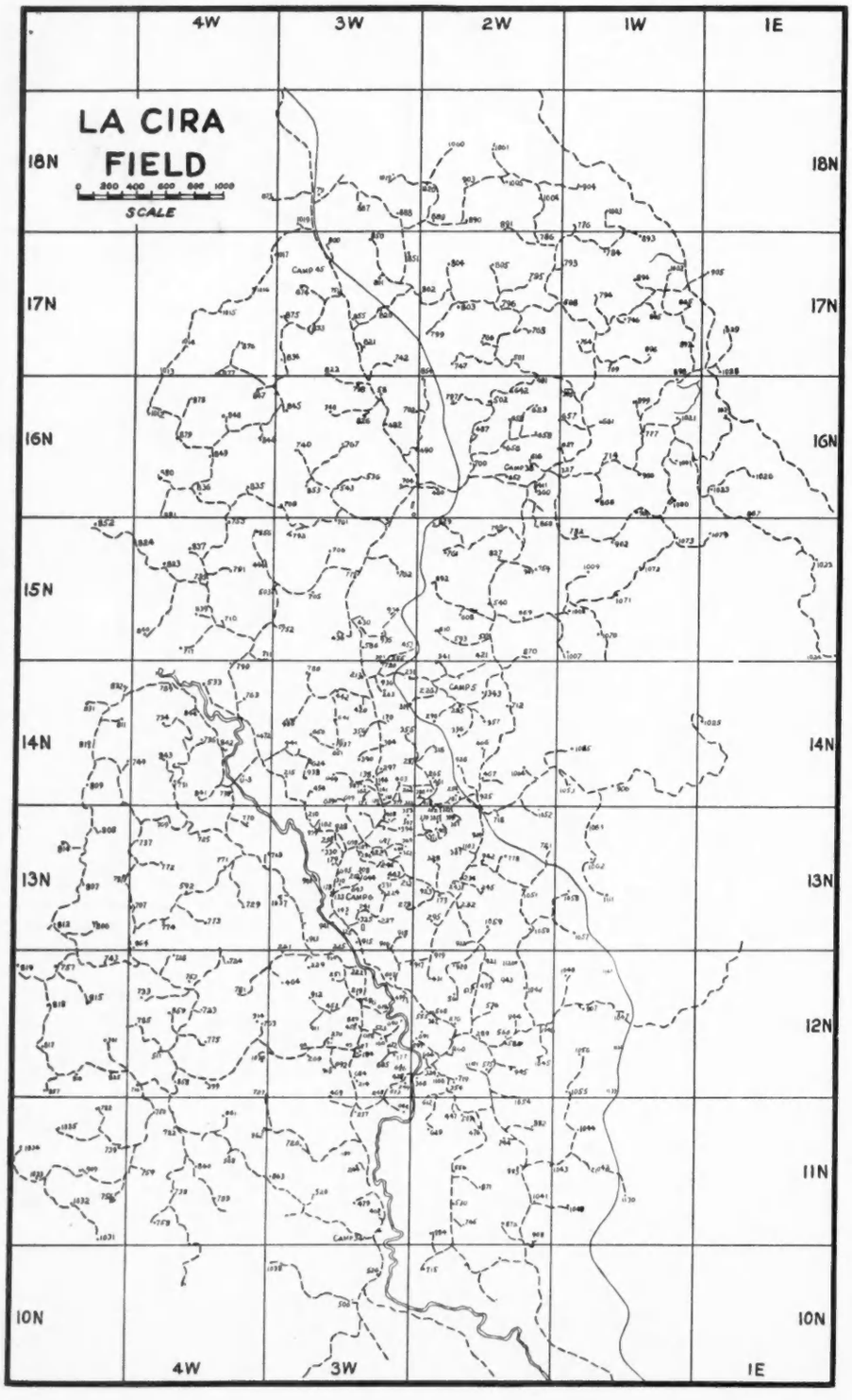
PACIFIC COAST DISTRIBUTORS:
Wagner-Morehouse, Inc., Los Angeles

minor thrust faults running at right angles to the major fault. Proven area of the structure is roughly two kilometers in width and 11 in length, the actual producing area being 5200 acres, or about 1950 hectares. The main producing zone is a Tertiary sand ranging from 300 to 500 feet in thickness, with its top lying at a depth of about 700 feet from the surface along the upper fault on the east side and plunging to around 2700 feet on the down-dip side. From 500 to 700 feet above the main zone there is another small sand which covers most of Infantas structure. However, it is commercially productive in an area of only three square kilometers, or 720 acres, on the north end.

As to the La Cira structure, it is a faulted dome type with one semi-main and several minor transverse faults. Early in December, 1938, the productive area outlined—oval in shape—had a length of eight kilometers and a width of six kilometers, with the actual producing area figured at 2800 hectares, or 6900 acres. Formations in La Cira are likewise Tertiary, and there are three producing zones overlying each other; the depths from the surface to their tops on the crest of the dome are roughly 700 feet, 1400 feet and 2300 feet, respectively. The sand zones are about 200 feet, 400 feet and 500 feet thick at the crest, but the thinning of these zones and the dip away from the crest of the structure carries the lower zone to a depth of 4000 feet near the lower edge of the producing area.



Average well spacing for Infantas is 10 acres, square pattern, and for La Cira it is 8-1/3 and 16-2/3 acres, equilateral triangle pattern.

960 Wells Completed

Up to December 1 a total of 960 wells had been completed in the two fields, 98 of them having been completed in the 11 months of 1938. Infantas was responsible for 470 of them, La Cira contributed 490. No direct failures have been experienced in developing the fields proper, the only abandonments and bad wells to-date being a few limiting wells on the edges of the structures.

Production of the fields by months for 1937 and the first 11 months of 1938 are shown in Table 1, (figures in barrels):

Out of 703 wells on production in the De Mares concession in November, 648 were on the pump and 55 were flowing, all of the latter except seven being in the newer La Cira field.

P. F. Shannon, general manager of Troco at El Centro, and R. M. Hurt, petroleum engineer, were kind enough to furnish the following breakdown in Table 2 of operating data for the two fields. The production values are as of November, 1938. In referring to the table it should be borne in mind that both structures yield mixed base oil, the API gravity of petroleum from Infantas ranging from 25 to 27.5 and that from

PREFERS . . . . . FRICK-REID Quality Products

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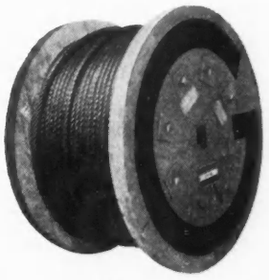
GILMORE Wire Lines



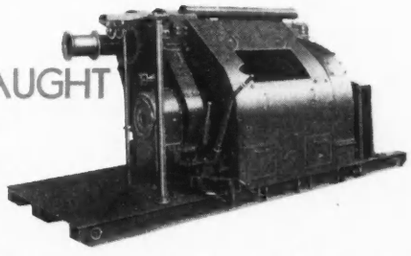
The factory and equipment for making Gilmore Wire Lines are the newest in America, which account for precision methods heretofore impossible. The diameter and curvature of the strands, for instance, are accurate to 1/1000 of an inch.

Such precision in manufacturing minimizes internal strains, more destructive than normal external wear. It encourages the line to spool accurately and handle easily.

In the Gilmore Wire Line we most highly recommend for oil country use, the Uni-Zact core is a remarkable improvement over ordinary non-metallic cores. It exudes the impregnated lubricant slowly and evenly. It gives a firmer, more uniform support to the strands, preserving the lay and diameter of the line. It is waterproof and rotproof.

Gilmore Wire Lines are made to deliver more ton miles—and they do.

DREADNAUGHT Drawworks

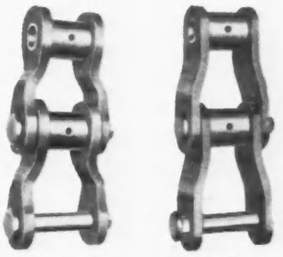


The Dreadnaught No. 12 heavy-duty 3-shaft 4-speed drawworks is rated to drill 12,000 feet with a safety factor of 2 on yield point. Large shafting of high tensile strength. Bearings only 86" apart. Free-rolling slow sprocket and clutch. Extremely large braking area, and a braking system which eliminates the dangerous kick of old type brake levers. Heavy-duty Hyatt roller bearings in all shafts. Backlash reduced to a minimum by two-step clutches. A fast, smooth drawworks, easy to handle and a pleasure to operate. Available with oil bath guards and force-feed lubrication, if desired. The guards enclose all chains, sprockets and clutches.

Dreadnaught No. 11 Drawworks has a drum shaft smaller in diameter than in No. 12, and a rated maximum safe drilling depth of 10,000 feet as compared with 12,000 feet for the No. 12.

See the Composite Catalog, Dreadnaught section.

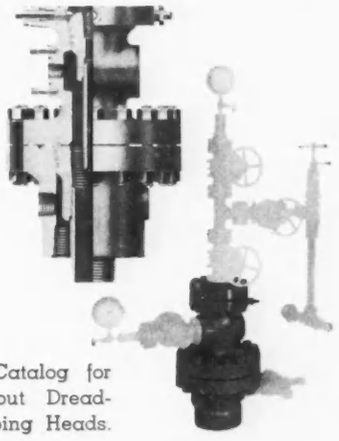
JEFFREY Chains



Jeffrey Chains for drilling are made to the standards of the American Petroleum Institute. They incorporate better steels, better balance, and greater precision, all based on more than 60 years of Jeffrey experience. The bearing surfaces are so finely finished that no Jeffrey Chain will stretch during the first several thousand feet of drilling. In other words, they get off to a better start and they last much longer. There is a Jeffrey chain for drilling at any depth and under any conditions. See the Composite Catalog for further information.

DREADNAUGHT Casing and Tubing Heads

Dreadnaught Type HZX Casing and Tubing Head assemblies are designed for use with blowout preventer equipment to facilitate all drilling and completion operations under pressure, and to provide a safe foundation for the Christmas tree manifold. Available with either flanged or threaded connections. These Dreadnaught assemblies permit reworking the well under pressure at any time after completion. Available tested to various pressures. The illustration shows a 6000-lb. test pressure Christmas Tree assembled on a Dreadnaught Type HZX all-flanged Combination Casing and Tubing Head. Note the cross section of the heads.



See the Composite Catalog for further information about Dreadnaught Casing and Tubing Heads.

Supply Corporation

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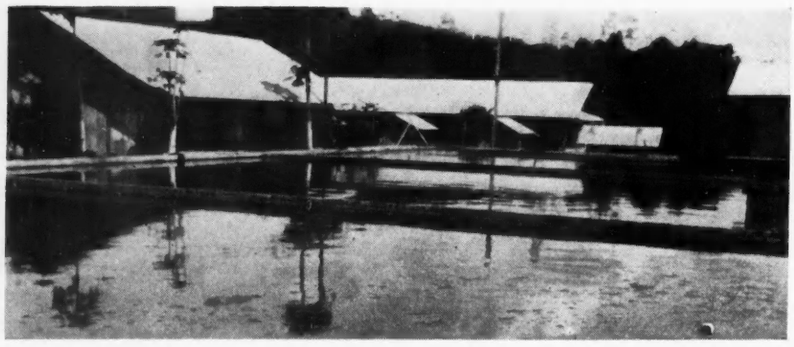
AND 73 BRANCHES IN OLD AND NEW FIELDS



At left are the water filtering reservoirs used by Tropical Oil Company to assure good drinking water for employees on the De Mares Concession. Below are shown the valves controlling the intake and output of drinking water for Infantas employees of the company.

TABLE 1

MONTH	INFANTAS		LA CIRA	
	1937	1938	1937	1938
January	506,000	459,000	1,154,000	1,289,000
February	505,000	459,000	1,091,000	1,019,000
March	480,000	474,000	1,113,000	1,340,000
April	552,000	439,000	1,082,000	1,177,000
May	559,000	462,000	1,093,000	1,341,000
June	548,000	431,000	1,162,000	1,378,000
July	525,000	429,000	1,147,000	1,373,000
August	537,000	423,000	1,021,000	1,429,000
September	508,000	398,000	1,085,000	1,382,000
October	521,000	442,000	1,277,000	1,426,000
November	534,000	436,000	1,249,000	1,408,000
December	519,000	.....	1,273,000	.....
Total	6,294,000	4,852,000	13,747,000	14,562,000

La Cira from 20 to 25, making the average gravity of oil recovered on the concession 24.5. Table 2 follows:

Production from Infantas and La Cira is split in the field for routing. In December about 9000 barrels per day was going to the Barranca Bermeja refinery of Tropical Oil Company and 52,000 barrels per day was being pushed through Andian National Corporation's line running from El Centro to Cartagena, ocean terminal of the latter concern. The Andian line is an almost completely looped double 10-inch system having 10 pump stations to take care of the 538-kilometer haul. The refinery at Barranca Bermeja, only 26 kilometers northwest of the fields proper, can run as much as 15,000 barrels per day. It is comprised of both stills and a coil, as well as a phenol treating plant.

TABLE 2

DATA	Infantas Structure	La Cira Structure
Total wells drilled to December 1	470	490
Total wells abandoned to December 1, 1938	19	3
Number of wells produced during November	293	410
Average daily net oil production in November	14,550	46,950
Gas returned to sands daily	3,787 MCF	13,030 MCF
Net gas-oil ratio in cubic feet per barrel (less returned gas)	1,690	1,250
Number of wells on pump during November	286	362
Number of wells flowed during November	7	48
Number of wells on artificial lift in November	.....	.....
Number of wells repressuring during November	16	15
Pressure input to RG key wells	215 lb–480 lb	560 lb–690 lb

Casing Program

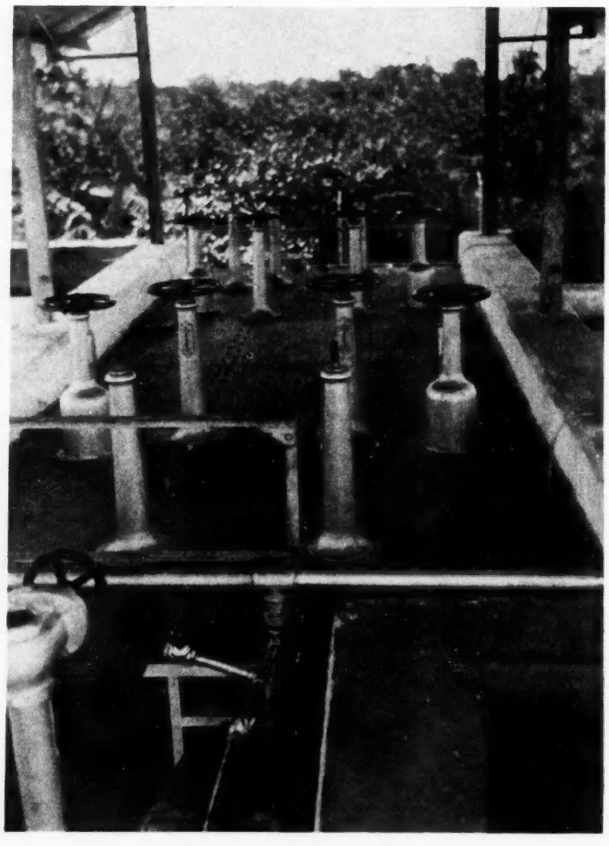
The average casing program as originally used at Infantas when development of the field first started called for about 120 feet of 16 or 21½-inch surface string, 11¾ oil string to the top of the pay, and then an 8⅝-inch liner through the oil sand. That program, however, has been gradually reduced. In December the general practice was to run 120 or 140 feet of 9⅝-inch surface pipe and a 6⅝-inch combination oil string with a perforated section on the bottom acting as a liner. This holds true for both fields.

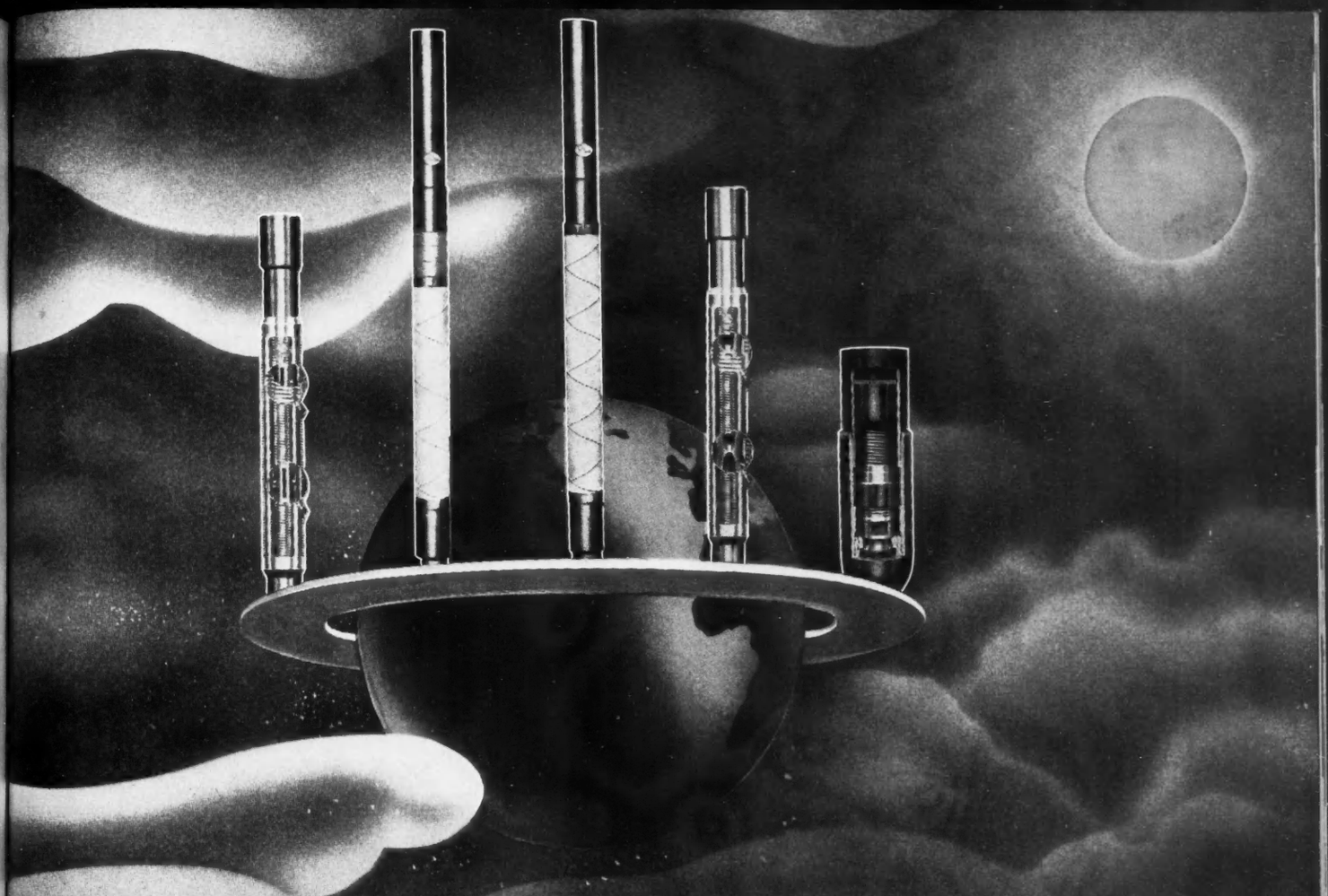
Subsurface pumping equipment at La Cira and Infanta generally consist of 2-inch and 2½-inch external upset tubing, ⅝-inch and ¾-inch sucker rods and various types of pumps. The most widely used barrel in the two fields is the tubing type with a sectional liner and a metal plunger, although a few fluid sealed units are used for dirtier, more troublesome wells. Also, a few common barrels with cups are used on the smaller or exceptionally clean wells.

Both Infantas and La Cira are electrified with power generated at a 7000-kilowatt plant located at El Centro. Power distribution is by a 13,200-volt primary system, with transformation to 440 volts for secondary supply at points of consumption in the fields. Power characteristics, according to Hurt, are 3 phase, 60 cycle, alternating current.

Pumping Equipment

As can be seen from the foregoing Table 2 on operating data, El Centro is a great pumping district. Surface pumping equipment consists essentially of individual units for wells, although there are two electric powered "catalinas," or central powers, op-





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THE LAYNE

WIRE WRAPPED SCREEN

The semi-wedge shaped wire produces a semi-wedge shaped opening that flares toward the pipe. This opening is a continuous and uninterrupted spiral extending the full length of the screen. The wire is wrapped directly onto the pipe so that all screen openings feed directly to the perforations in the pipe.

The Layne Wire Wrapped screen reduces cutting, assures cleaner oil and is easier to wash when necessary. Wire Wrapped Screen is available with Milled Groove, Plain Drilled or Slotted perforations.

SCREW THRU SETTING TOOL and RATCHET PACKER

When the setting point is reached with this combination, you rotate the string eleven turns to the right and the setting tool disengages from the packer. Upon disengaging, the string drops 25 inches. These two surface actions not only provide a positive check on the release but there can be no disengaging of Setting Tool and Packer without these actions.

The Packer has 42 inches of finest grade canvas that compresses to approximately 20 inches of almost iron hardness. There is a lead ring at bottom to provide additional sealing-off effect.

SET SHOES

The Layne Line includes a type for every operation. There is the Signal Closing Type which automatically shuts off the slowly running pump, signaling when the valve is closed. Our Seamless Steel Shoe has two brass back pressure valves. The Screw Down Valve Type screws down to close. It has 4 water courses. The valves, screw down unit and wash ring are of brass, assuring ease of milling out if necessary to go deeper.

The Inserted Type Set Shoe is designed to provide as much screening surface as possible. The shoe is inserted in the screen. It is brass throughout, except the guide plug.

LAYNE & BOWLER CO.

HOUSTON, TEXAS, U. S. A.

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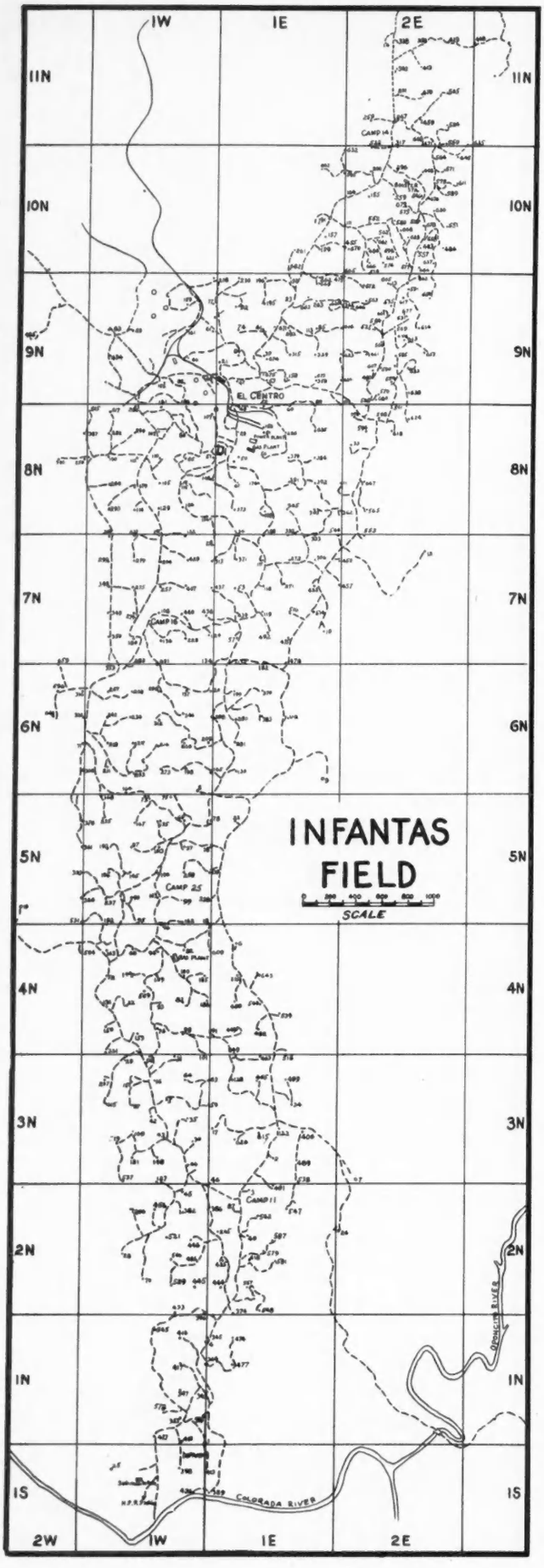


erating 29 wells equipped with various kinds of "store bought" and lease fabricated jacks. Some of these lease fabricated arrangements indicate an ingenuity for salvaging junked material that is amazing, e.g., a combination of a discarded rotary table, drive, wrist pin and crank forming a central power pulling three wells and a dummy for a counterbalance. The larger of the two central powers is in La Cira and pulls 25 wells.

There are 27 wells on the Infantas structure with jacks. These are pulled by rod lines hooked by back crank take-offs to individual units on nearby wells. Most of these individual units are of the twin-crank type with double reduction gears and crank counterbalances, although a few single crank units in the lighter sizes are noticed here and there, as well as 31 standard-front type rigs with which the first pumping wells were originally equipped. Electric motors driving these units are predominantly of the high torque design. Power consumed averages approximately 0.8 kw. per barrel of gross fluid lifted.

Derricks and Service Equipment

Tropical has not standardized on any particular type of derrick at either field. Several types are used; the pumping derricks are 87 and 114-foot standard design. Heavier drilling derricks are used, but on completion of the wells these are dismantled and replaced with the pumping type, which are left over the individual wells for servicing work. About 60 of the shallower wells are permanently equipped with locally fabricated gin poles, A-frames, or tripod derricks.

Two classes of units are used for well servicing. For rod and tubing jobs standard single drum, jaw clutch hoists powered with 40 and 60-horsepower electric motors having compensator control are used. Current for the motors is obtained from a plug connection which constitutes a standard part of the pumping motor control on each well. The hoists are mounted on light trucks with auxiliary dual rear ends.

Double drum hoists of conventional design are mounted on tractors for heavier servicing and cleanout work. The company owns and stocks the tools used for cleanout and servicing work. These consist of regular bailers, hydraulic bailers, perforation cleaners, and the usual assortment of fishing tools, such as spears, swages, wall hooks, overshots and the like.

Dehydrating 30,000 Barrels

Due to the fact that the sands in the fields are fairly well consolidated, no unusual amount of trouble is had with them. Formation pressures are not high enough to cause cutting of liners, and plain slotted pipe is used. Gross fluid potential of pumping wells in the field averages 100 barrels per well, roughly speaking, so that moderately slow speed and medium stroke of units makes for a minimum of rod and tubing trouble. Subsurface corrosion is rare because sulphur is present only in a negligible quantity.

About half of the combined production of La Cira and Infantas, or 30,000 barrels per day, is being dehydrated. Treatment is through two centrally located plants, one large and one small. Both operate with complete gravity flow, and heating is obtained through old field boilers which have been converted into direct fire heaters. Chemical is added and then

the emulsion is run through vacuum separators to free it from entrained vapors, after which it passes through excelsior tanks and on to 1500-barrel settling tanks.

Five Gas Plants

The DeMares concession boasts of five gas plants, three in Infantas and two in La Cira. Compressor equipment consists of 51 low pressure and 22 high pressure units, all 180-horsepower, horizontal twin cylinder, two-cycle direct drive type. About 50,000,000 cubic feet of raw gas is being treated daily, giving a gross yield of 90,000 gallons.

Four smaller plants on the concession are of the booster type with mineral seal absorbers. Charged oil from these goes back to the main El Centro plant for stripping through two standard type distillation units.

Repressuring

El Centro presents one of the largest repressuring projects in the world, a subject which will be handled later by The Oil Weekly in a separate article. But the picture of the field would be incomplete without brief mention of it here.

Late in 1928 gas return was started on a small scale, but it was not until 1931 that the quantity returned reached an appreciable figure. Since then a daily return of from 17,000 m.c.f. to 28,000 m.c.f. has been maintained, the present average being 17,300 m.c.f.

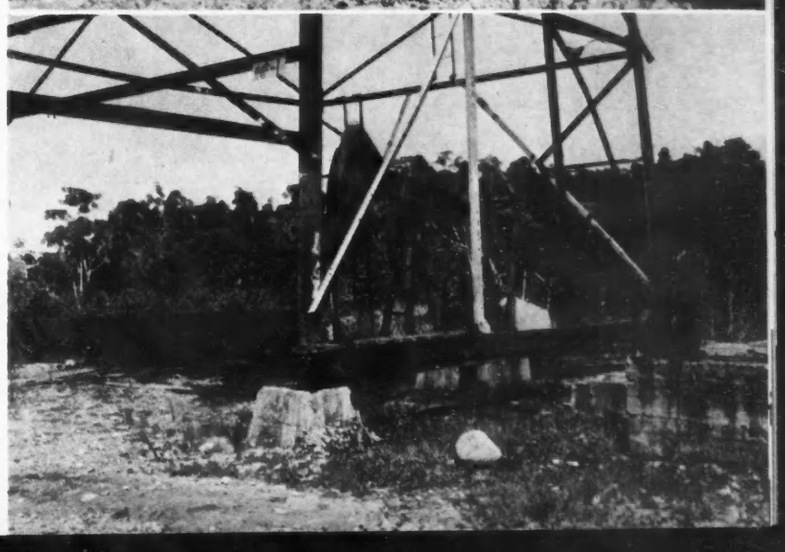
In some sections of El Centro, where close spacing makes for gas by-passing, results are doubtful, but input to these areas has been stopped and the general results for the field as a whole are considered satisfactory.

For high pressure gas system service and on input key wells Tropical uses plug valves. Regular type orifice flow meters are employed for gas measurement on individual key wells. These are equipped with seven-day clocks.

The writer was unable to obtain original formation pressures in the field when the initial wells were put on production. They were not on record, but it is assumed that they were approximately equivalent to fresh water head, that is, 0.43 pounds per foot of depth. Hurt figures this indicates about 600 pounds for the C zone along the upper side of the Infantas anticline and 850 pounds for the C zone at the crest of the La Cira structure. Pressures at these points in December, 1938, averaged about 350 pounds in Infantas and 620 pounds in La Cira.

"Believe It or Not"

There is one for Ripley's "Believe It or Not" column in connection with repressuring at La Cira. In June, 1930, well No. 328 was chosen as a key well for repressuring. Gas was sent into the formation through it at a low pressure at first. The pressure was gradually increased until they were putting it in at 750 pounds. This was kept up until April, 1936—almost six years—when the key well blew out, shooting an 11-inch stream of oil over the crown block. It continued to perform thus for 10 days before it could be brought under control. The connections were gas cut and it took that long to fabricate special clamps.



A few of the several types of pumping equipment observed by the writer while visiting in La Cira and Infantas fields of Tropical Oil Company in Colombia.

★ When you use T-I-W

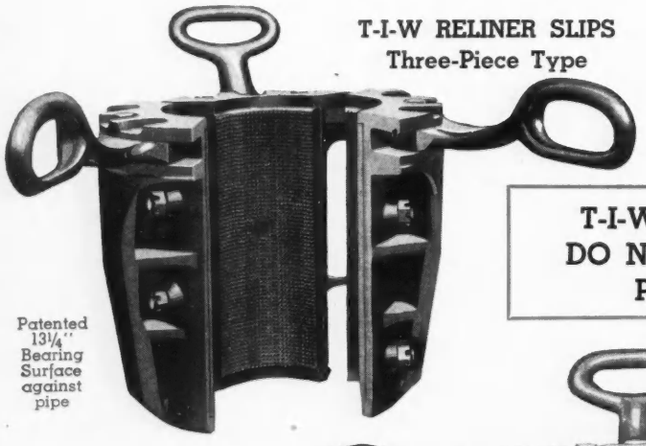
★ SLIPS

★ YOU DO NOT HAVE TO PURCHASE A COMPLETE NEW SLIP WHEN TEETH ARE WORN

because OF THE MONEY-SAVING T-I-W RELINER PRINCIPLE

1. **Liners can be resharpened many times.** 2. **Liners can be replaced when completely worn.** Saves buying a complete new set of slips, when after long use and resharpening many times, the liners finally wear out. 3. **Liners for different sizes of pipe can be used in the same slip,** thus saving the operator from having to buy different complete slips for different sizes of pipe.

T-I-W RELINER SLIPS
Three-Piece Type



Patented
13¼" Bearing Surface against pipe

T-I-W SLIPS DO NOT CUT PIPE

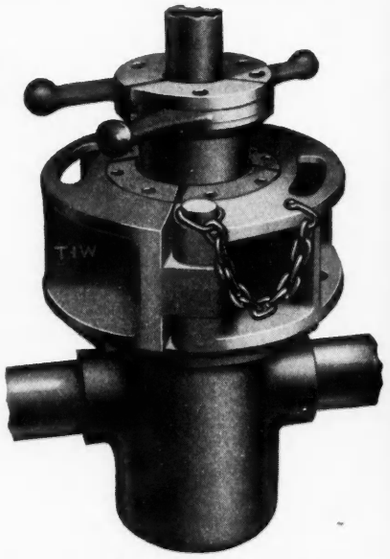
T-I-W RELINER SLIPS
Two-Piece Type

Showing the two halves of Two-Piece Slips, also liners for same. 13¼" bearing surface against pipe.

FOR DEEP WELLS

Patented

T-I-W LONG RELINER SLIPS, 3-PIECE TYPE, WITH ADAPTER, which makes 62 percent added length possible, giving 20" bearing surface against pipe.



Assembly showing T-I-W SPECIAL TUBING SLIP AND SPIDER

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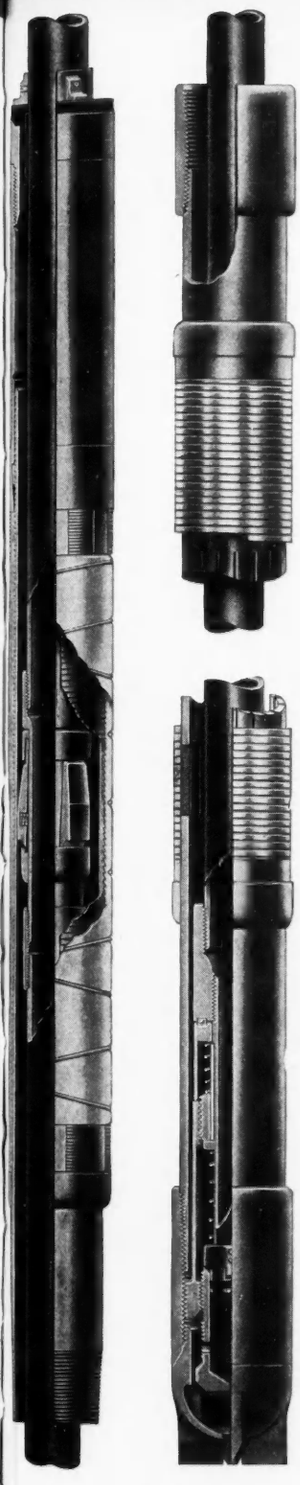

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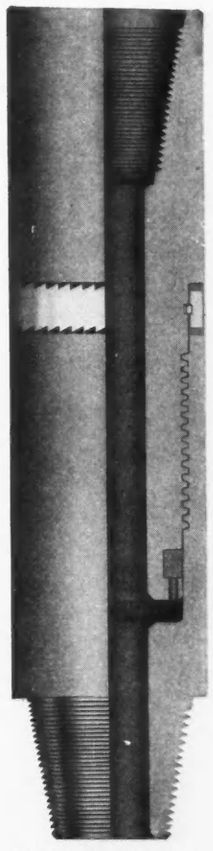
A life-saver and a money-saver. Circulation is not restricted in any way. Being lubricated, it can always be counted on for positive action in an emergency.

T-I-W *Type* "A" LINER PACKERS

Saves you from having to make a round trip to recover setting tool. Employed where tubing is used as a setting string, a recommended practice for wells under small allowables.

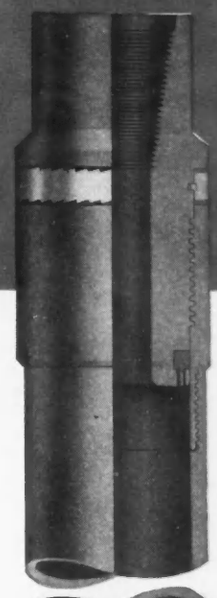


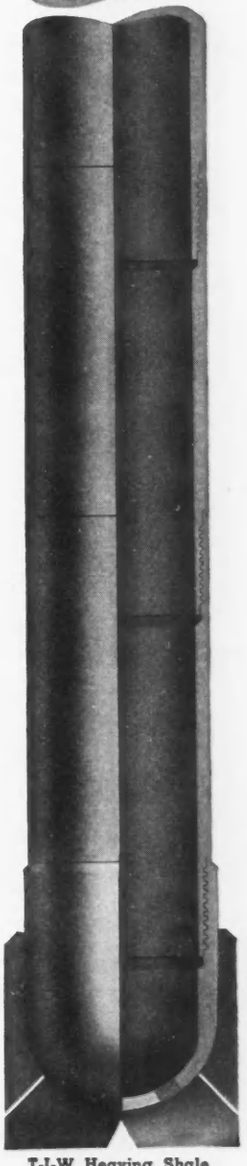
T-I-W SAFETY JOINT

Strong as any joint in the string. Breaks out on left rotation at one-fifth the pressure required to break out a tool joint.

T-I-W HEAVING SHALE DRILLING ASSEMBLY

When heaving shale sticks pipe, drill stem is rotated to the left, breaking out the T-I-W Safety Joint. Then T-I-W Shale Bit is easily milled through, and the procedure repeated with smaller diameter flush joint casing.





T-I-W Heaving Shale Drilling Assembly (Patent Pending)

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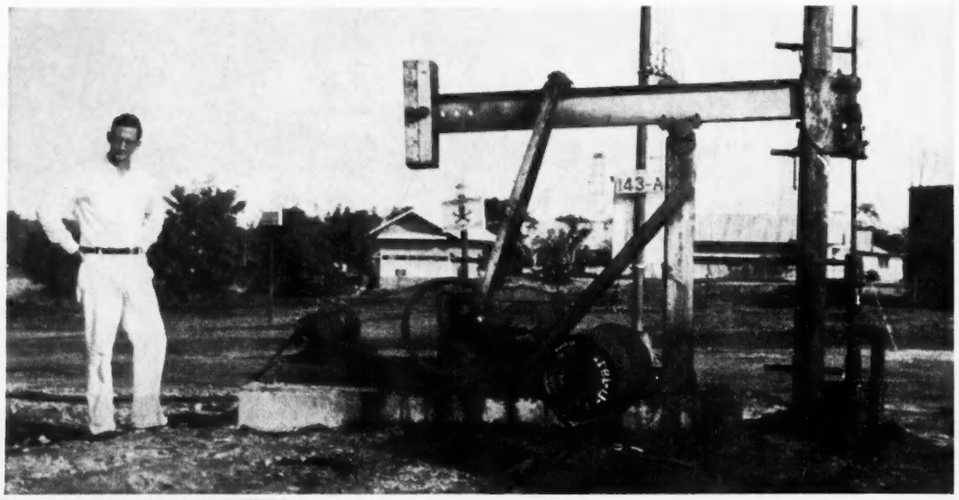
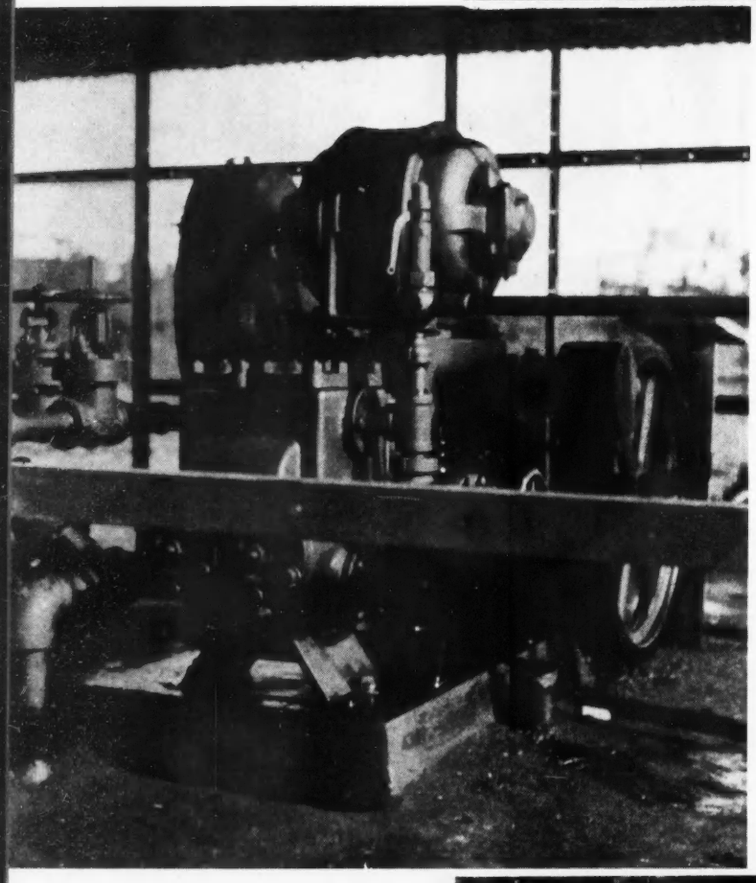
At right Louis V. Arango, petroleum engineer for Tropical Oil Company, standing in front of a little outfit used to lift 660-foot production in Infantas field with a one-horsepower motor. Below is a little line pump run by a 25-horsepower motor that shoves 130 barrels of oil an hour from La Cira to El Centro tank farm, seven kilometers away.





Drilling Program

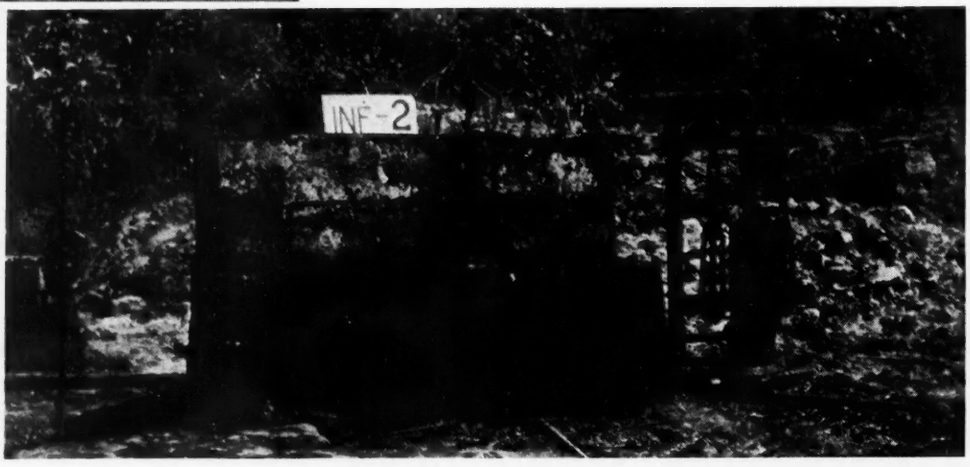
For the last two years Tropical has kept six drilling crews busy on the De Mares concession. It will continue to do so in 1939. All strings are rotary and sufficient rigs are used so that rigging up and dismantling can be taken care of ahead of and behind the regular drilling crews, allowing them to operate without loss of time and to keep drilling constantly. From 10 to 12 wells per month will be completed in 1939, based on performance in the field during the past two years.

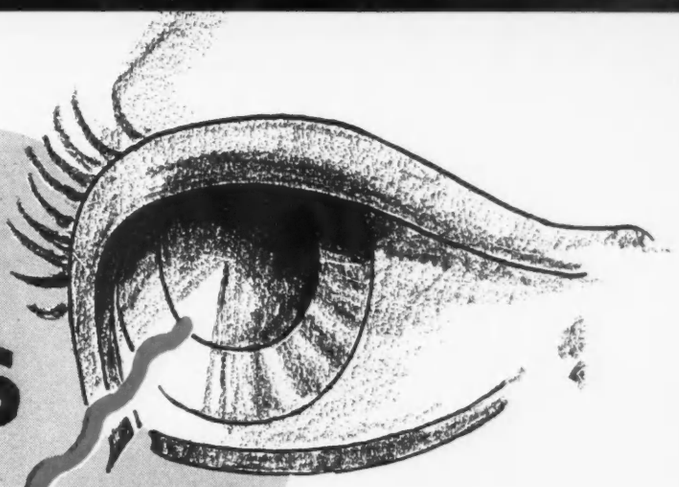
Steam is used for drilling at La Cira. (Infantas is drilled up.) Engines, pumps and draw works are of conventional design. Heavy drilling derricks of 122-foot height are used. A six-line string is generally used for drilling and an eight-line one for setting casing. These are standard 6 x 19 hemp center, 1-inch diameter, plow steel type.

Pour Pumping Base First

One special point in La Cira drilling well set-up which is different from general procedure in other fields is the pouring of the concrete pumping unit base at the time the well is rigged up for drilling. Units used in La Cira are skid mounted, so that a base roughly 5 feet wide, 14 feet long and 2 feet thick is poured in the engine-draw works position of the rig. Steel sub-bases for drilling engines are fabricated locally, and these are set on the pumping unit

This is the historically important Infantas 2, the first well to produce commercially in Colombia and the discovery well of Infantas field, the area that made of the De Mares Concession a paying proposition.





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HOUSTON, APRIL 24-29, 1939

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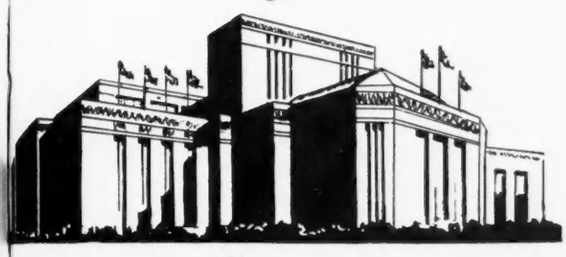

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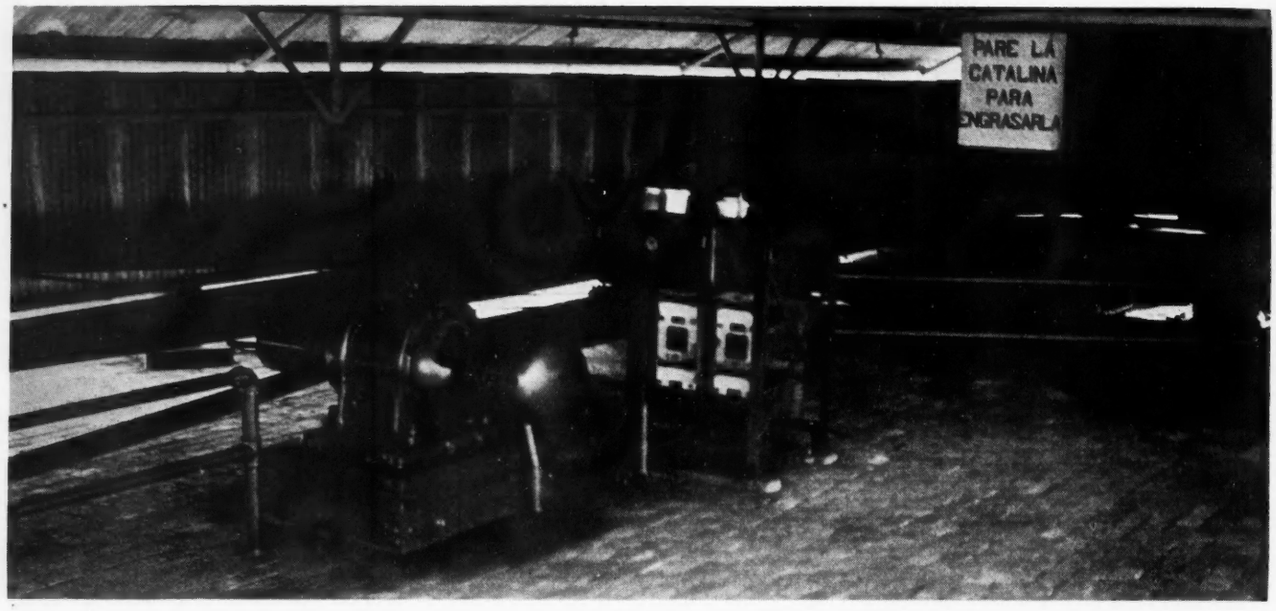


Showing the motor and central power arrangement for pulling A and B zone wells (1600 and 1800 feet deep) in La Cira and Infantas fields in Colombia.

base, a practice which eliminates considerable rigging up time with no added cost. (Most of the wells completed at La Cira have to be placed on the beam almost immediately after completion anyhow.)

Some rock bits are used in deeper wells in the field, but general equipment for ordinary wells does not involve their use. Formations are fairly soft and present no special drilling problems. Most of the wells make sufficient mud to do the job, although a few cases of lost circulation have been experienced periodically. In these cases, mud has been hauled from a local pit.

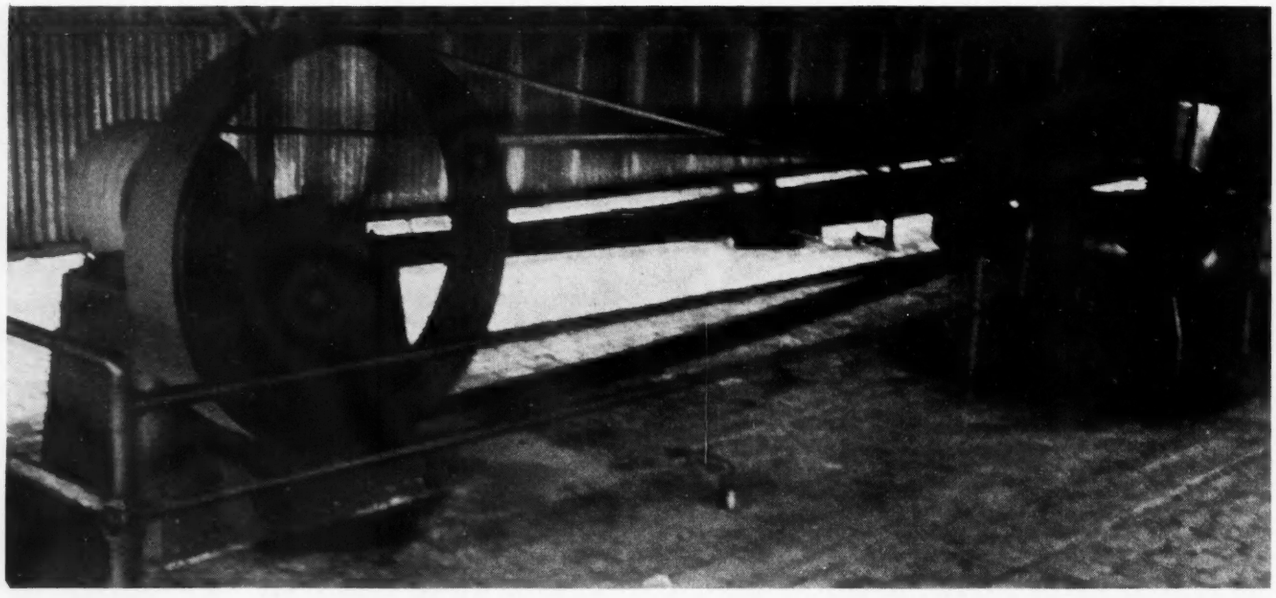
Pressures can be handled adequately with straight clay mud, so that weighting material has not been necessary except in a very few cases when the field was first opened.

The petroleum engineering staff is of the opinion that the combined use of electric logging and gun perforating, which have now become standard practice at La Cira, has done much to speed up drilling work. Doubtful edge wells or locations in unproven territory are completed with a blank combination oil and liner string and then successively shot from bottom upwards in stages for tests.

La Cira's deepest test, now waiting on cement to set around 6⅝-inch landed at 7589, is headed for the Cretaceous. The well is No. U-3 and is approximately in the center of the structure.

Wildcatting in El Centro district proper can only be classed as semi-exploratory. It consists of step-outs of approximately one kilometer from drilled areas. Four such step-outs are planned for the east edge of La Cira in 1939. Roads have been completed to two of these locations, one of which has the derrick waiting for a rig.

Showing how the drive from the 60 horsepower motor is reversed before it is sent to the central power, which takes care of more than 25 wells in the La Cira section of the De Mares concession.



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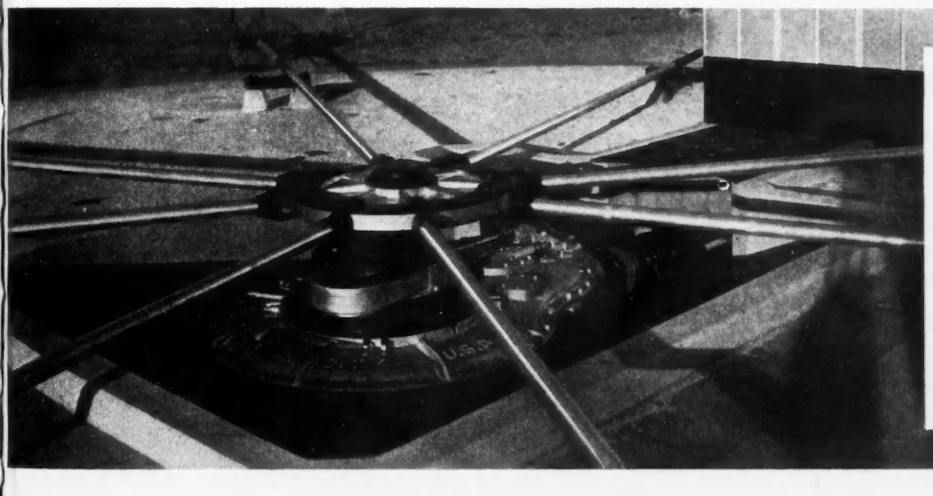
Nominal Rating at 20 s.p.m. (horsepower)	Peak Torque Capacity at 20 s.p.m. (inch-pounds)	Maximum Stroke (inches)	Polished Rod Load Capacity (pounds)
11.4	56,500	37½	10,000
23.2	116,000	54	14,000
31.7	157,000	54	14,000
31.7	157,000	74	20,000
41.9	207,500	74	20,000
52.6	260,000	74	20,000

"OILWELL" TWIN-CRANK PUMPING UNITS

Nominal Rating at 20 s.p.m. (horsepower)	Peak Torque Capacity at 20 s.p.m. (inch-pounds)	Maximum Stroke (inches)	Polished Rod Load Capacity (pounds)
4.55	22,500	24	5,200
7.8	38,600	30	8,000
23.2	116,000	54	14,000
31.7	157,000	54	20,000
31.7	157,000	77	20,000
31.7	157,000	74	25,000
41.9	207,500	77	20,000
41.9	207,500	74	25,000
52.6	260,000	77	20,000
52.6	260,000	74	25,000



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Nominal Rating at 20 s.p.m. (horsepower)
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Hard Lime Slowing Up Blue Goose in Peru

Pachitea wildcat logs 50-gravity oil at 1200 feet; objective depth is 6000 feet; concession being developed by California money.

REPORTS from the principal backers of the test being drilled in central eastern Peru by Blue Goose Oil Company (Compania de Petrolia Ganso Azul Ltd.) state that showings of 50 gravity oil were encountered around 1200 feet and that the bit is making slow progress below 2000 feet in a hard limestone formation.

Robert B. Moran, geologist, who only recently returned from the project in Peru, revealed that Agua Caliente 1, wildcat, spudded last July, penetrated shales and sand and finally topped a very tough limestone formation which has delayed drilling considerably. This limestone formation was expected to be found much lower, based on conclusions reached by geologists, but since it has already been topped, the drilling crew under the supervision of C. E. Kelly, of Drilling and Exploration Company, Los Angeles, contractor, is making the most of it. More than 500 feet of limestone so far has been penetrated, and with the 6000-foot level being the ultimate goal, it may take some time to learn what production will be developed, although three shifts are being worked by the crew.

Something over 90,000 acres were blocked by the oil company, financed by American capital, all of which came from the Pacific Coast. The land being explored is in the Department of Loreto, about three hours by launch from Masisea on the Ucayali river and its large tributary the Pachitea river. Described as a plain by Moran, it attains an elevation of 700 feet. The land controlled by the company is separated from the producing coastal fields of Peru by the high Andes. In structure the area controlled is more related to Colombia and Venezuela. Well defined, the

Wildcat of Blue Goose Oil Company in Peru which has already found showings of oil at 1200 feet, but which is continuing drilling to the contracted depth of 6000 feet.

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Your experience in using "HERCULES" **(Red Strand)** will prove that we are justified in this pride . . . because, this Wire Rope will prove its superior quality to you . . . the result of our determination to make it do so.

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Airplane view of Blue Goose Oil Company's wildcat drilling on a 90,000-acre concession in Peru. This view shows the camp occupied by the workers.

property is approximately 16 miles long and 10 miles in width, running northwest by southeast.

Geology worked out on the properties leased from the Peruvian government was done as early as 1930, this work continuing in 1931 and 1932 before other preliminary work was done, such as laying out a camp site and starting construction of roads to bring in equipment for large-scale operations. Douglas Fyfe, resident geologist, Moran and Glen M. Earl, all of Los Angeles spent a great part of the time in aerial geology, and in astronomical observations to define the boundaries of the property. Out of 3,000,000 unsurveyed acres once considered as prospective oil lands, the block of 90,000 acres was selected.

For centuries the network of rivers in Peru afforded excellent means of transportation, and this method will be utilized by the oil company to barge out the oil if commercial production is found. The rivers are large permitting vessels to operate on them throughout the year. The Ucayali joins the Maranon river, 800 miles to the north, a main affluent of the Amazon. From the port of Iquitos, at the junction of these two large rivers, communication is direct to the Atlantic.

Moran said the importance of finding oil in central eastern Peru is that it would go toward the opening up of this sparsely populated region, as well as add another oil field to those previously developed on the coast. Peru has been a world producer of oil since 1869. Her coastal fields average 12,000,000 barrels annually.

Aside from what progress the company has been making with the drill in its initial wildcat test, officials of the company declined to furnish any facts or figures as to the total investment involved in the Peru venture, but it is said to represent a substantial amount. If and when oil is found, the company will pay a stipulated government royalty. Their lease requirements are somewhat similar to those in the United States.

An interesting sidelight was furnished by Moran. He revealed that it was remarkable the way the Peruvian native learned to adapt himself to American methods, that is, handling modern equipment in the field. Most of the Peruvians who assisted greatly in constructing roads and a camp site, never saw a tractor until one was taken to the well site. The natives had to start from "grass roots." They learned to operate tractors, drive trucks, and were undeniably proud of this accomplishment. Not only that, but they got a genuine kick out of it.

Portable electric plants furnish the camp with light. Refrigerators, and most of the conveniences known to home-life in the United States, are supplied. Ice, to the native Peruvian in the jungle, is unmistakably a curio. They are given handfuls of ice cubes to take to their relatives far back in the bush, and cannot understand where, or why, the ice disappears before they reach their homes, a matter of a two days' trek. There has been no serious illness among the men, no malaria, no dysentery. In general, the natives, a small people, are healthy. Among the personnel of 150, nine are Americans.

There are no autos, no roads and no horses in the area occupied by Blue Goose Oil Company. The one horse in Masisea is a source of interest for miles around. The population is scarce, although there are scattered farms and a few small villages along the rivers on the plains. Apart from these plains along the rivers millions of square miles of dense jungle forest make up the greater part of the region.

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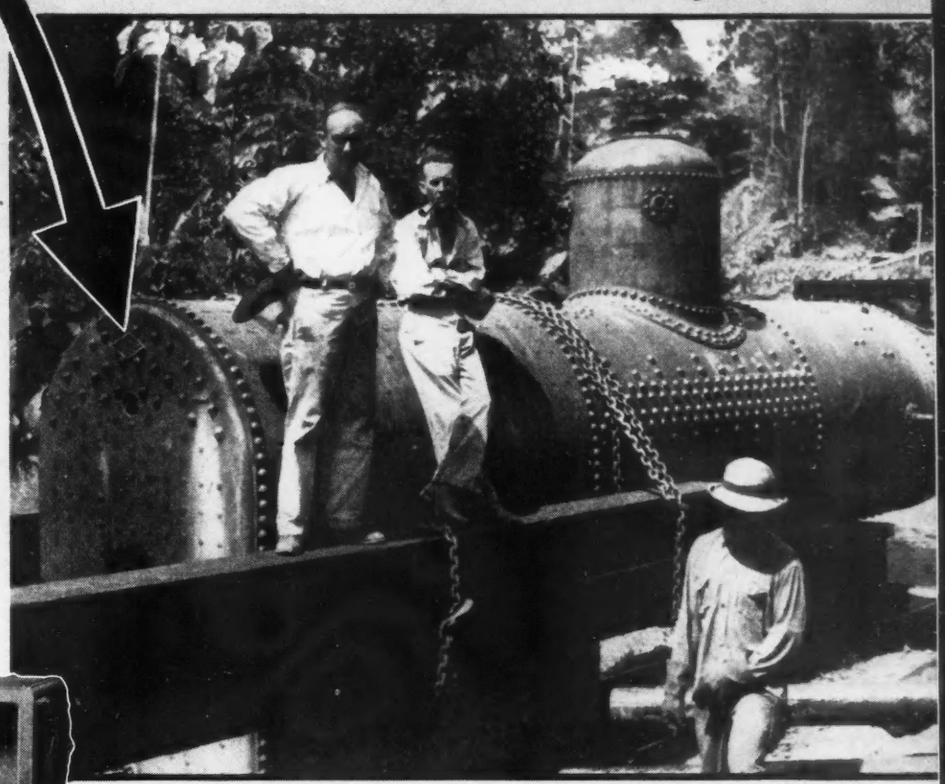

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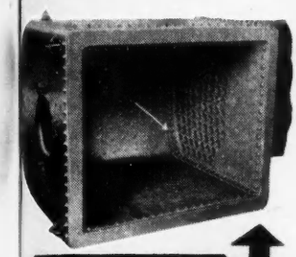

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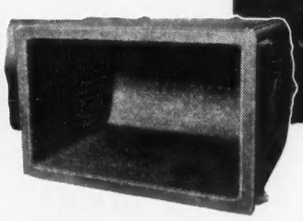

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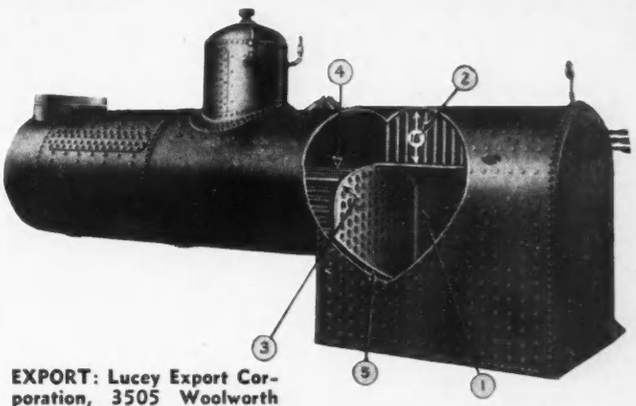

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[*Continued from page 54*]

Hungary (Continued)

The success at Budafa-Puszta led the government to resume exploratory drilling in the Great Hungarian Plain, east of the Danube, and at the end of the year wildcats were being drilled at Nagybatony and at Mezokovesd. Meanwhile, a wildcat at Recek was further testing the basin in which the Bukkszek field was located.

India

Increases in several fields cause gain in crude production in India

As Published in Records of the Geological Survey of India (covering 1937)

Production of petroleum in India (including Burma) increased from 334,811,624 gallons in 1936 to 350,322,222 gallons in 1937, the highest figure in the history of the industry.

The increase in 1937 was due to increases of approximately 20,000,000 gallons from Singu, 5,500,000 gallons from Attock, 1,250,000 gallons from Thayatmyo, and 1,000,000 gallons from Digboi, which outweighed decreases of about 9,500,000 gallons from Yenengyaung and 2,000,000 gallons from Yenangyat.

Natural gasoline production in 1937 from natural gas amounted to 10,616,313 gallons in Burma and 456,780 gallons in the Punjab.

Yenengyaung continued as one of the outstanding fields of the world in 1937, although its production was smaller than in the previous year. At the end of 1937 there were 2910 producing wells in the field, including a large number of shallow wells and 180 hand-dug wells.

The deep drilling activities of 1936 in the southeastern part of the field died down in 1937, because of unfavorable results, and on the east side the limits of production were largely defined.

Gas is injected into the reservoir for gas drive and also with the object of repressuring and storage.

At the end of 1937 there were 568 producing wells in the Singu field, as compared with 480 a year before. The repressuring operations of the British Burma Petroleum Company, Limited, continued to give satisfactory results. Production from most wells in the field was obtained by ordinary pumping methods.

Because of large new production from the Singu fields, the output of the Lanywa field in 1937 was still further restricted. During the year an inclined well was commenced to tap the known oil sands beneath the Irrawaddy River. Back pressures are maintained on nearly all wells in this model field, which is operated by the Indo-Burmah Petroleum Company, Limited. Although some wells are pumped from a central power, the majority have individual pumping motors. The gasoline plant gave satisfactory results.

At the end of 1937 there were 374 producing wells in the Minbu district, which had been relatively inactive during the year, apart from routine production.

The Indaw field showed an increase in production in 1937. All producing wells were operated by automatic gas lift.

In the Thayetmyo district there was a decrease in production in the Padaukpin field, but Yenanma field showed an increase, in consequence of an extension of the producing area.

During the year Burmah Oil Company abandoned its deep test at Monatkon at 8319 feet, no productive sands having been encountered.

Kyaukpyu continued to yield comparatively small production.

In Assam the Digboi field showed a small decrease in production.

No production occurred in the Surma Valley. The well at Masimpur was abandoned after having proved unproductive. But seismic work and core test drilling were in progress at the close of the year in an effort to learn more about the structure.

Attock Oil Company, Limited, operated the Khaur and Dholian fields in the Punjab. In the Khaur field a deep test of the limestone around 5500 feet proved disappointing.

In the Dholian field two deep tests were put on production in May and November, 1937.

Iran

Output gains slightly, with one major field up and another down

By ANGLO-IRANIAN OIL COMPANY

With the object of coping with great depths and high pressures already encountered in Iran and anticipated in the future, considerable research is being made into pressure drilling and mud flush problems.

Crude oil production of the two major fields, Masjid-i-Sulaiman and Haft Kel in 1938 totaled 77,230,000 barrels, which was a little more than the 76,590,000 barrels produced in 1937. Output at Masjid-i-Sulaiman was down to 27,240,000 barrels in 1938 from 33,110,000 barrels in 1937, due partly to depletion of the oil column, but that at Haft Kel increased to 59,990,000 from 43,480,000 barrels. The later field has steadily in-

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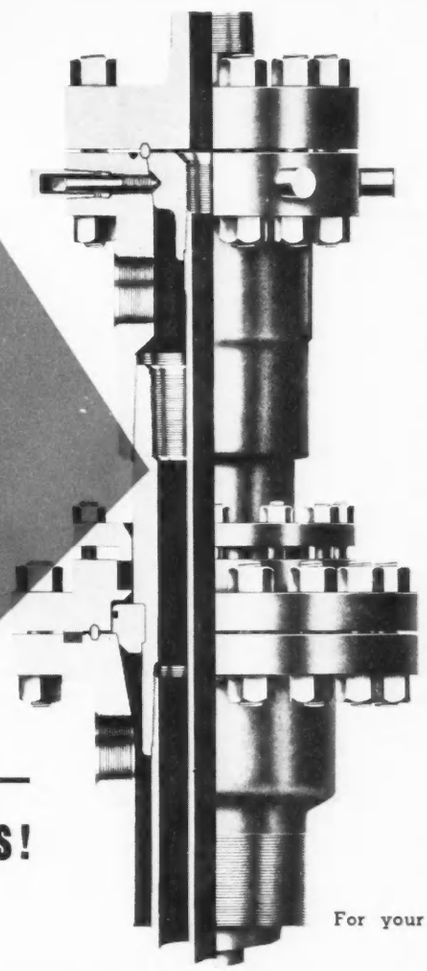

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creased since it began producing in 1929.

At Masjid-i-Sulaiman the reservoir pressure continues to decline only about 0.3 pounds per square inch per million tons of net production, despite the age of the field. It is expected that production of the area will be stabilized for several years henceforth around the present figure of 3,000,000 tons annually. Drilling in the field in 1938 was limited to deepening old wells and putting down new wells required for maintenance of production and control of the reservoir.

A deep test at Haft Kel has established the productivity of the Eocene, which underlies the Asmari limestone, the main producing horizon. And a wildcat to the northwest in the White Oil Springs area has been completed as the discovery oil well of a separate structure.

Production of the Naft-i-Shah field continues to supply market requirements in northwest Iran.

Two productive wells completed in 1938 further defined the Gach Saran field, but edge water has not yet been encountered, and the ultimate size of the field cannot yet be forecast, although the area already proved is 20 miles along the strike and 5 miles wide at its broadest part. Survey work for a pipe line to the coast is under way.

Exploratory work in virgin areas of Iran has been encouraging. A deep test proved productive at Agha Jari, 55 miles southeast of Haft Kel and 70 miles northwest of Gach Saran. Gas has been found in two wells at Pazanun, immediately southeast of Agha Jari. Prospecting is in progress on the Lali structure, 20 miles northwest of Masjid-i-Sulaiman, but the only success so far has been the finding of small production in the Asmari.

Poland

Crude oil production is increased by drilling in established fields

By JOSEF ZWIERZYCKI
Chief of Oil Division of Geological Survey of Poland

Through extension of drilling, Poland production increased slightly in 1938, although no new fields were discovered. Consequently, known reserves decreased.

Drilling was confined largely to the Jaslo district, especially in the Lipinki-Libusza field, because of the shallow depths of productive sands there.

At Boryslaw field, drilling did not arrest the steady decline of production.

In the Stanislawow district, production declined slightly, despite the continuation of drilling at about the same rate as in the previous year.

When the Polish oil industry was more prosperous in the past, it neglected to carry on extensive wildcatting, and now the companies are no longer financially able to do such work. Exploration is being to some extent subsidized by the government, but subsidy funds are limited and are being used largely for maintaining production and for providing extensions of proven fields. However, increased funds for more exploration are under consideration by the government.

Introduction of repressuring, flooding, and perhaps mining are contemplated for increasing production. Major operators plan to ask government assistance in putting into effect plans that have been drawn up in detail for repressuring the Boryslaw and Lipinki fields.

Geophysical work and some drilling have been undertaken in the salt dome region of northwestern Poland. In the province of Pomorze, 3 salt domes have been known since the end of the past century, being at Inowroclaw, Wapno, and Gora. At Inowroclaw traces of oil have been repeatedly observed. Recently, indications of a fourth dome have been found, near the township of Barcin, and a wildcat has been started by the Geological Survey of Poland. Geophysical work will be continued with seismographs and gravimeters. However, interest of oil capital is needed, and subsidizing of drilling, as in Germany, is being urged on the government to promote development, although legislation has not yet been introduced.

Gas production in Poland is steadily developing. The Daszawa field has been defined on the southeast by edge water. Similar slightly raised domes are believed to lie in a row in the syncline bordering the Carpathian Mountains on a line with the folds on the mountain side end and gentle structures begin. On this line are the gas fields of Opary, Daszawa, Balicze, Kalusz, and Kossow; and on the same line a new gas field, Popowice, near Przemysl, was discovered late in 1938, with the first gas sand at a depth of 500 meters.

Peru

Leasing and prospecting carried on in southern and eastern Peru

By OLIVER B. HOPKINS
Imperial Oil, Limited

Peru's production of 15,838,610 barrels in 1938 was 1,618,406 barrels under that of 1937. All production, as in previous recent years, was from the La Brea-Parinas, Lobitos-Restin, and Zorritos fields, on the northwest coast.

The government continued drilling wildcats on the reserved zone near Zorritos, and did geological work in southern Peru in the Pirin region, north of Lake Titicaca.

In eastern Peru, Compania Petrolera El Ganso Azul continued exploration in the mountains, and the first test was reported to have encountered an oil show at 1000 feet. Leasing was revived in east-

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ern Peru, especially near Contamana

On International Petroleum Company, Limited's property at La Brea-Parinas Estate, production in 1938 was 13,137,988 barrels, or 1,584,766 barrels less than in 1937. Cumulative production since 1890 has been 191,528,755 barrels.

In 1938, 65 wells were completed, including 54 oil wells, 2 gas wells, and 9 dry holes. Several semi-wildcats provided moderate extensions of productive areas.

On the Lobitos property, north of La Brea-Parinas Estate, production was 2,660,622 barrels, or 34,426 barrels less than in 1937. Cumulative recovery there has been 43,977,405 barrels.

Production from the Zorritos property in 1938 was estimated at 40,000 barrels.

Venezuela

Extensive prospecting in Eastern Venezuela results in new fields

By JOSEPH A. HOLMES
Standard Oil Company of Venezuela, Caracas, Venezuela

Venezuela's production reached a new peak of 190,231,780 barrels in 1938, although that was only 2 percent more than 1937 output, whereas the 1937 production was 20 percent greater than that of 1936.

The Lake Maracaibo fields supplied 73 percent of the oil produced. Lagunillas remained the largest contributor, despite a 17,000,000 barrel decrease, the 1938 output having been 35.3 percent of the Venezuela total. Tia Juana yielded 23.4 percent of the Venezuela total in 1938, La Rosa 13.7 percent, Quirequire in Eastern Venezuela 13.2 percent, Mene Grande 6.6 percent.

Two new fields, Temblador in Eastern Venezuela and Bachaquero, most southerly of the Lake Maracaibo fields, began to ship oil during the year.

At the end of 1938, 2657 wells were producing, of which 2425 were in western and 232 in eastern Venezuela. Of the total, 36 percent were on natural flow, 57 percent were pumping, and 7 percent were on air or gas lift.

Drilling in Venezuela in 1938 comprised 521 wells, of which 506 were producers, 6 less than in the previous year. These wells included oil discoveries in 3 wildcats and a major extension, 6 gas wells in proved fields, and 15 dry holes.

Tia Juana was the most active field in western Venezuela from the standpoint of drilling, and Lagunillas ranked second. In eastern Venezuela, Quirequire continued to hold first place from the standpoint of both production and drilling. The Officina field was actively drilled, although not yet on a shipping basis. A road and a 16-inch pipe line are under construction from the field to deep water near Guanta on the northern coast, 100 miles away.

Exploratory drilling in western Venezuela in 1938 was limited largely to extension tests in the lake area, and light oil extensions of the LaRosa and Tia Juana fields were provided, while a small well was completed at Pueblo Viejo, between the Lagunillas and Bachaquero fields. Current exploration includes a deep, Eocene test in Mene Grande field, a wildcat on the Rio Motatan to the south, and a deep, Cretaceous test in the Rio Tarro field.

In Eastern Venezuela, extensive wildcatting is in progress and it has resulted in completion of commercial oil wells at El Tigre and Jusepin, a small pumper at Merey, and a 5 kilometer extension of Temblador field. Tests are being drilled at Santa Ana, Al Roble, San Joaquin, Indios, Aceital, and Cerro Negro. Dry holes resulted at Maturin, Algarrobo and Suata.

Trinidad

Principal development is on Guapo fault in southwest part of island

By P. E. T. O'CONNOR
Antilles Petroleum Company (Trinidad), Limited

Production in Trinidad reached a new all-time peak of 17,737,061 barrels in 1938, compared with 15,502,989 barrels in 1937, bringing cumulative output up to 162,818,403 barrels.

The completion of 231 wells in 1938 brought cumulative completions up to 2641 wells. In 1938, 41 wells were abandoned.

At the end of the year, 1304 wells were on production, including 428 flowing, 516 pumping, 81 on gas lift, 123 on plunger lift, and 156 operated in miscellaneous ways.

The principal development in 1938 was along the Guapo fault, which extends from Point Ligoure to Coora, across the southwest part of the island, and which is the major factor governing oil accumulation in the area.

The Coora field at the south end of the fault was actively developed in 1938, and it now ranks as one of the major fields of the island.

Approximately 7 miles to the northwest, on the north side of the fault, at Los Bajos, another important producing area has been developed.

Moreover, several widely spaced wells indicate ultimate production in the whole 7-mile interval between Coora and Los Bajos.

Penal field, pumping 1500 to 2000 barrels daily of heavy oil, was put on regular production upon completion in 1938 of a pipe line to Point Fortin refinery.

Extensions and discoveries of deeper pay sands occurred at Forest Reserve, Kern, and Point Fortin.

Some success rewarded active wildcatting in several areas. Areas explored included the Mayaro, Moruga, Cedros, Morne Diable, Erin, and Point Ligoure districts.

Two 10,000-foot tests, drilled with heavy duty Diesel drilling units, were spudded late in 1938 in the Northern Basin, north of the Central Range, following seismograph work.

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Germany

Encouragement given by drilling, and increase in production made

By WALTER KAUENHOWEN
Deutsche Vacuum Oel A. G., Hamburg, Germany

Production of Germany in 1938, including that of Austria, now a part of the German Reich, was 4,259,717 barrels, or 25.3 percent more than the comparable production in 1937.

The production of Germany exclusive of Austria was 3,864,518 barrels, or 21.7 percent more than that in 1937.

For Ostmark (Austria), production totaled 395,199 barrels in 1938, or 70.8 percent more than in 1937. That output in 1938 represented 9.3 percent of the total for the new Reich.

Of Germany's 35,000,000 barrels of cumulative production since 1872, about 47 percent was produced in the years 1933-1938.

Drilling in Germany in 1938 comprised 220,000 meters, of which 90,700 meters were in productive fields, 57,700 meters were in wildcats subsidized by the government, and 41,600 meters were in wildcats not subsidized by the government. About one half of the meters drilled in the past several years were drilled in wildcat wells, two thirds of which were subsidized by the government.

Prospecting proved encouraging at Reitbrook near Hamburg, Heide in Holstein, Eicklingen-Sandlingen near Celle, Steimbke near Nienburg, Worms in the Rhine Valley, Gifhorn near Braunschweig, Molme near Oberg, and in other areas.

The deepest well drilled in 1938 was Holstein No. 14, near Heide, abandoned at 12,523 feet. The deepest test in 1937 had been an 11,152 foot well, Weinhausen No. 10, near Celle.

Mexico

Expropriation brings about some drastic changes in oil economics

By V. R. GARFIAS, Cities Service Company

As was to be expected, expropriation brought about drastic changes in the economic picture of the petroleum industry. The daily average crude production in 1938, which before expropriation was close to 132,000 barrels, declined after expropriation approximately 25 percent to 96,500 barrels daily.

Exports in 1938 before expropriation averaged about 55,520 barrels daily and declined to 33,535 barrels, or approximately 39.5 percent, after expropriation.

Apparently to counteract the decline in exports and the depreciation of the peso, a 12 percent ad valorem tax, to be applied to exports, was created on August 10. The total tax per barrel on Mexican oil exported increased as much as 75 percent after expropriation.

With the exception of some 300,000 barrels of Panuco crude that were purchased before expropriation, practically all the oil exported after expropriation has been paid for largely in barter. Although no direct comparison can be made of prices before and after expropriation, it is evident that expropriation has brought about a demoralization of the entire price structure. To illustrate: at the beginning of the year Panuco crude was selling f.o.b. Tampico at 91 to 96 U. S. cents per barrel, excluding taxes, while after expropriation this crude could have been purchased for figures of the order of 45 U. S. cents per barrel. After expropriation Poza Rica crude was sold f.o.b. Tampico for about 72 U. S. cents a barrel, excluding taxes, (97 cents including all taxes) but payment was made on a barter basis. Later in the year, Panuco sold, f.o.b. Tampico, for about 65 cents ex taxes (85 cents including taxes) and Poza Rica for about 60 cents f.o.b. Tampico, ex taxes (85 cents including taxes), both sales on a barter basis.

Roumania

Two minor discoveries made during year through drilling 10 wildcats

Courtesy of W. P. HAYNES

Roumania's crude oil production in 1938 totaled 48,984,200 barrels, or 8 percent less than the 53,239,500 barrels produced in 1937. The decrease would have been 18½ percent by excluding Ceptura and Baicoi-Tintea fields, which showed gains. Baicoi-Tintea is expected to show a further increase in 1939, but Ceptura is expected to experience a marked decline.

Drilling of 961,000 feet in 1938 in Roumania was 25 percent less than that of 1,278,000 feet in 1937.

Roumanian fields that produced over 4,000,000 barrels in 1938 included West Gura Ocnitei, Moreni, Baicoi-Tintea, Boldesti, and Ceptura. Tintea is expected to assume greater importance in 1939.

Although no major discoveries were made in 1938, the most important probably was that at Draganeasa, while a well testing at Magurele gives some promise. Thus out of 10 wildcats drilled on known structures only two minor discoveries resulted. Moreover, areas outside the much-drilled Ploesti and Bacau regions probably will have to be explored in order to find important new fields. But changes in the mining laws and state land grants must be made before capital will venture into such exploration.

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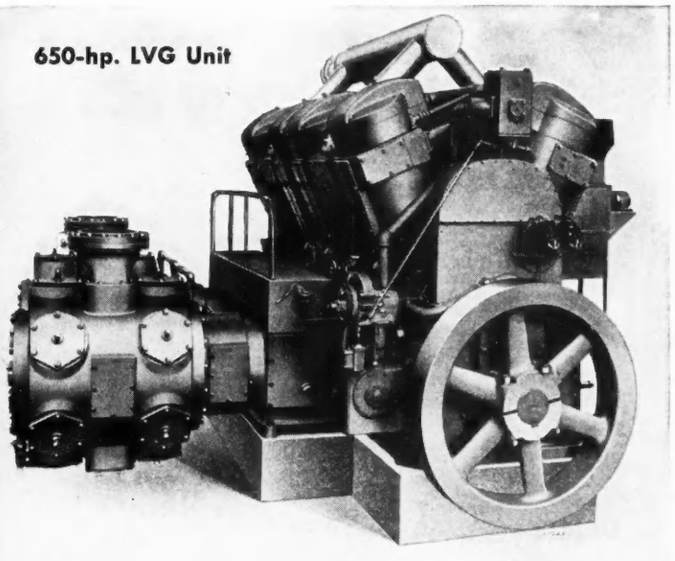

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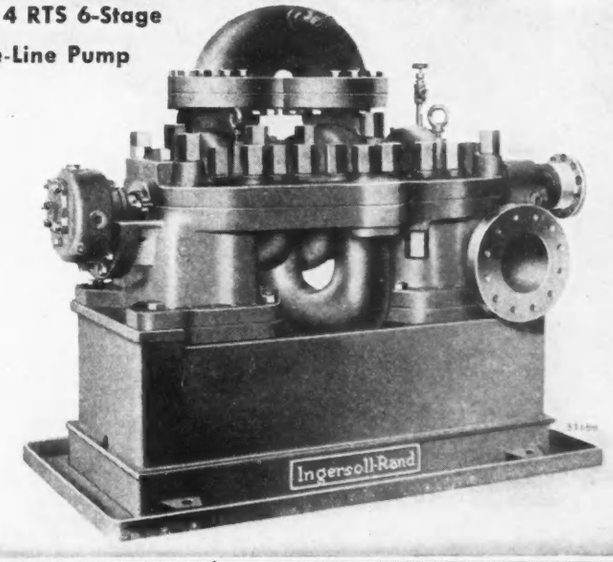

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724-14

Two-thirds of Germany's Footage Drilled in Wildcats

State financed prospecting yielding new petroleum reserves; new depth records established; production sharply increased.

By PROF. DR. W. HAACK, State Geologist
Prussian Geological Institute

THE World Oil Congress to be held in Berlin in 1940 will offer foreign visitors an excellent opportunity to learn of the steady progress the German oil industry has made in the past, particularly in the development of new productive oil fields.

Due to the close cooperation of technique, geology, paleontology and geophysics, as well as the wholehearted support of the government in the form of extensive wildcat drilling, one cannot fail to observe that Germany has increased its production and reserves by a wide margin. In 1938, a great number of tests were made, not only in the already established fields, but in new ones as well, the latter being particularly financed by the Reich and known as the so-called "Reichsbohrungen," (Reichs tests).

Depth drilled in 1937 amounted to 187 kilometers, or 613,516 feet, which will compare with an approximate total depth of 190 kilometers drilled in 1938. Two-thirds of the total 1938 depth can be credited to various wildcats. Of these wildcats, approximately 30 percent were supported by the government.

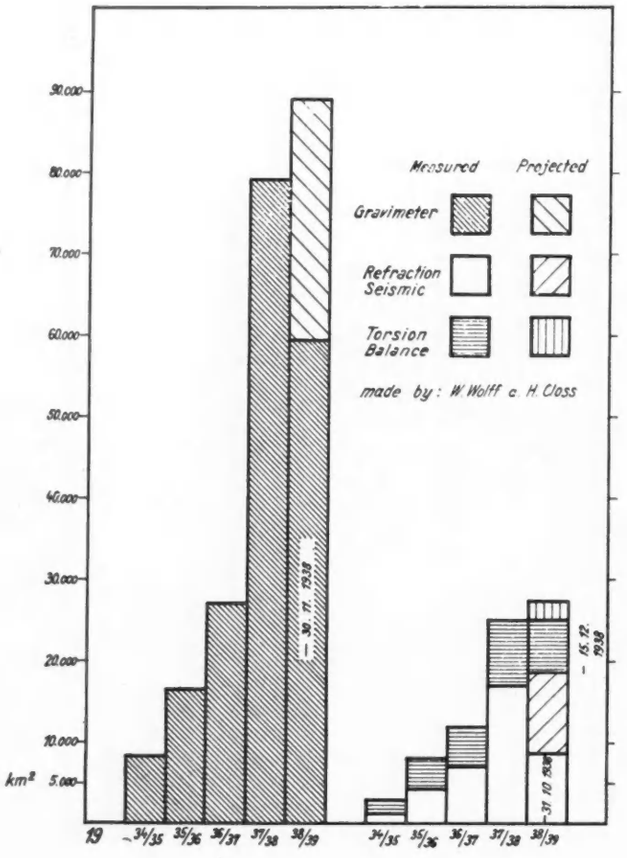


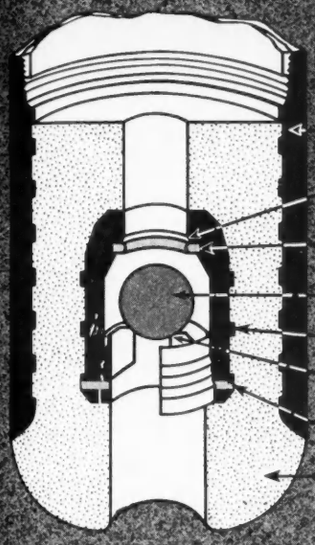
Chart shows extent of geophysical state surveying in Germany from 1934 to 1939, exclusive of magnetic or electric work. Periods are shown from April 1 of one year through March 31 of the next. Average space of gravimeter measurements, 1934 to April 1, 1937,—3.9 stations per 100 square kilometers; 1937-1938,—5.3 stations per 100 square kilometers; 1938-1939,—5.5 stations per 100 square kilometers. Torsion balance measurements shown were made at a spacing of 240 stations per 100 square kilometers.

Deepest in Europe

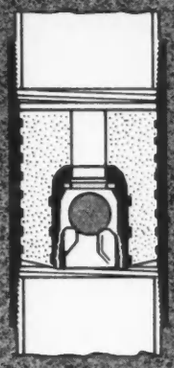
In 1938, one of the Reichsbohrungen, Holstein 14, near Heide, in the province of Schleswig-Holstein, established the record of being the deepest test in Europe. This well, drilled by the Deutsche Petroleum A. G., reached a depth of 12,526 feet. It is quite probable that the test would have been carried deeper had it not been for various difficulties encountered at this depth. In 1937, the second deepest test, Wienhausen 10, drilled by Gewerkschaft Elwerath, is likewise considered a Reichs test. The total depth amounted to 11,150 feet.

New Fields

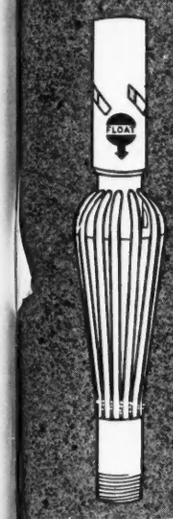
The extensive drilling program sponsored by the Reich since 1934 has led to the discovery of 14 new oil fields. Most of these fields, of which several no doubt will have a good future, are located like the four older fields, (Wietze-Steinforde, Hanigsen-Nien-



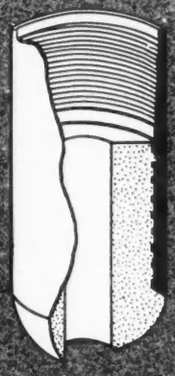
Baker Cement Float Shoe



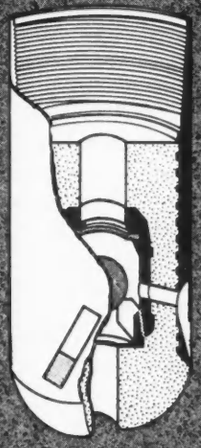
Baker Cement Float Collar



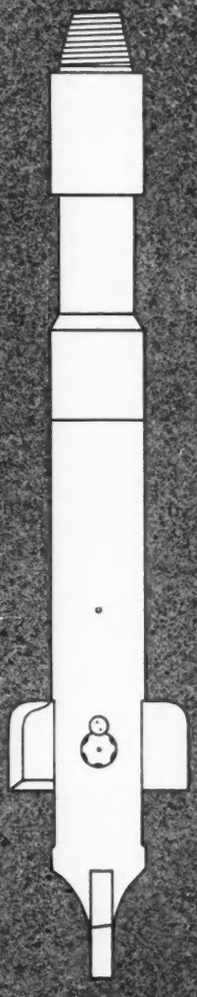
Baker Cement Whirler Float Collar with Solid Bottom Baffle, with Metal "Petal" Basket



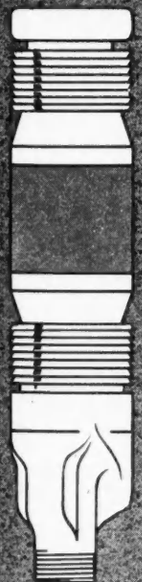
Baker Cement Guide Casing Shoe



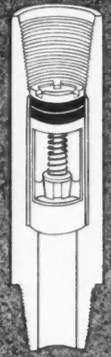
Baker Cement Wash-Down Whirler Float Shoe



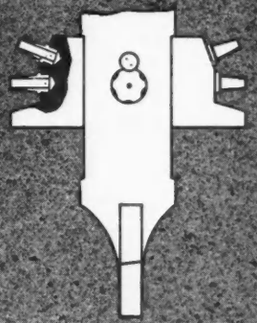
Baker Rotary Wall Scraper



Baker Model "K" Cement Retainer



Baker Bakwik Model "B" Drill Pipe Float



Lower Section of Baker Rotary Wall Sampler

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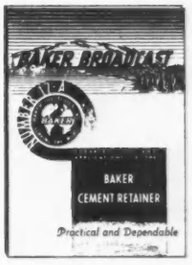
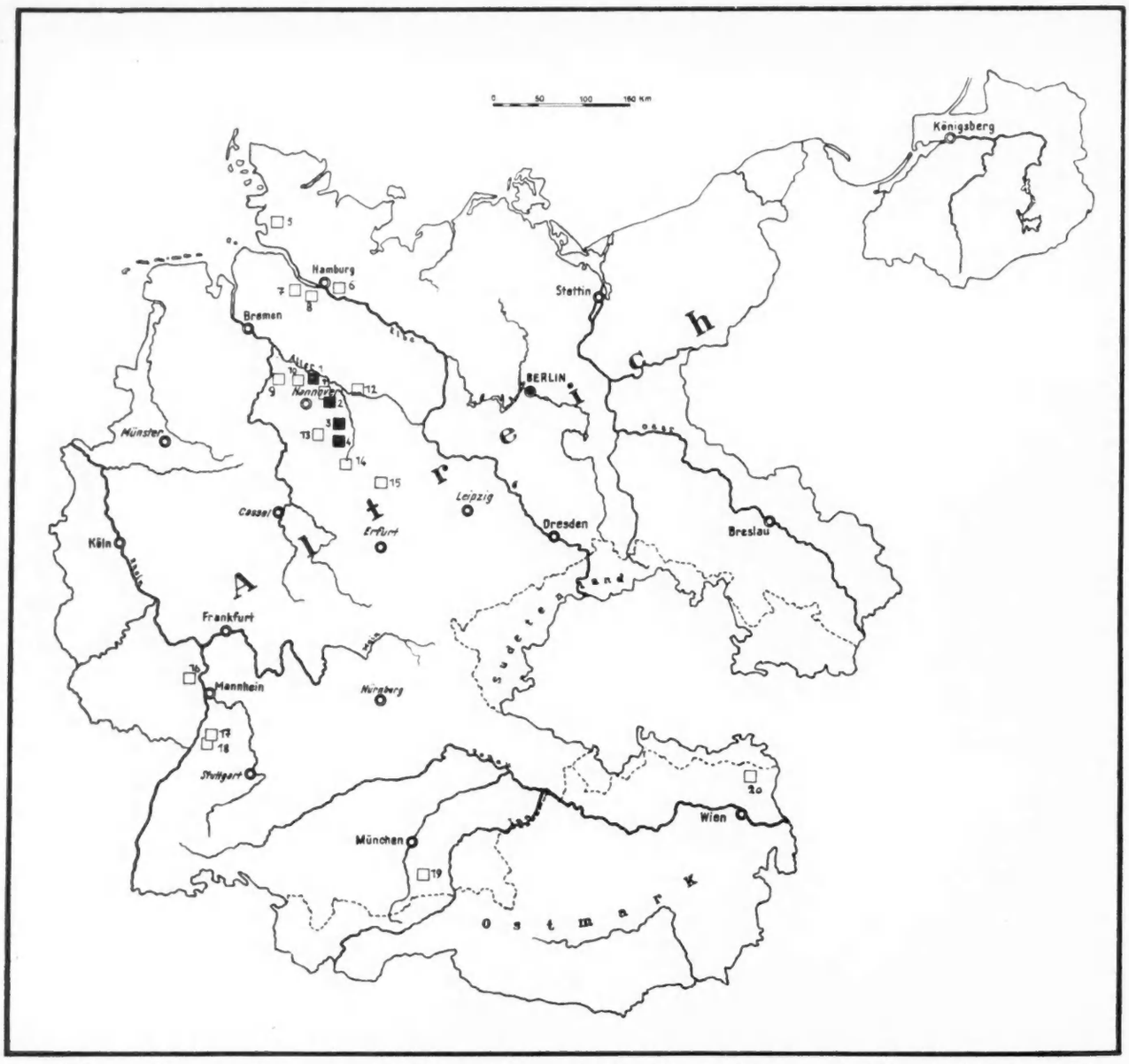
The Baker Rotary Wall Scraper Broadcast is No. 19; the Baker Cement Retainer is covered in detail in Broadcast No. 17-A;



MODERN CEMENTING PRACTICES are described and illustrated in Broadcast No. 18. Any or all of these Broadcasts are sent promptly to any oil man upon request. The complete line of Baker Oil Tools is described in

your current Composite Catalog, as well as in the individual Baker Catalog, also available upon request. Operators desiring additional or specific information are requested to address Baker Oil Tools, Inc., Box 71, Huntington Park, California, U. S. A.



Map of Greater Germany, showing the old fields and the new fields. The old fields are: 1, Wietze-Steinforde; 2, Hanigsen-Nienhagen; 3, Olheim-Eddesse; and 4, Oberg. The new fields are: 5, Heide; 6, Reitbrook; 7, Sottorf; 8, Meckelfeld; 9, Steimbke; 10, Adolfsgluck; 11, Eicklingen-Sandlingen; 12, Gifhorn; 13, Molme; 14, Broistedt; 15, Fallstein; 16, Worms-Osthofen; 17, Forst-Weyher; 18, Weingarten; 19, Tegernsee, and 20, Zistersdorf.

hagen, Olheim-Eddesse, and Oberg) in the northwestern part of Germany. Heide field is in the province of Schleswig-Holstein; Reitbrook, Sottorf, Meckelfeld, Steimbke, Adolfsgluck, Eicklingen-Sandlingen, Gifhorn, Molme, Broistedt, and Fallstein fields are in the province of Hannover-Braunschweig. In the plains of the upper Rhine, the following new fields are located: Worms-Osthofen, Forst-Weiher and Weingarten, and in Bavaria, the field of Tegernsee.

Besides the various fields mentioned previously, a great number of Reichsbohrungen and other wildcats have been drilled, the results of which have been so encouraging that the discovery of additional fields is practically assured. Of 270 Reichsbohrungen drilled in the years 1934 to 1938, there were 35 brought in as producers, or 8 percent of this drilling program.

Efforts of various oil companies to extend older fields and the discovery of new fields by means of the Reich drilling program have increased crude oil production greatly. The crude output in 1938 can be estimated to be approximately 550,000 metric tons. In 1937, production amounted to 450,000 metric tons. The most productive oil fields are still in the northwestern part of Germany, which produce approximately 98 percent of the total output.

Due to the annexation of Austria and the Sudeten country of Czechoslovakia by Germany in 1938, the total production of crude oil during that year was further increased because of obtaining the important Zistersdorf field north of Vienna. In 1937, Austria produced 33,010 metric tons of crude, or four times as much as in 1936. After Austria was annexed, drilling activities were greatly extended, and the production in 1938 consequently increased further; it is assumed that total production there will amount to approximately 62,000 metric tons. The total output

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Weight: 11,660 Lbs. Complete

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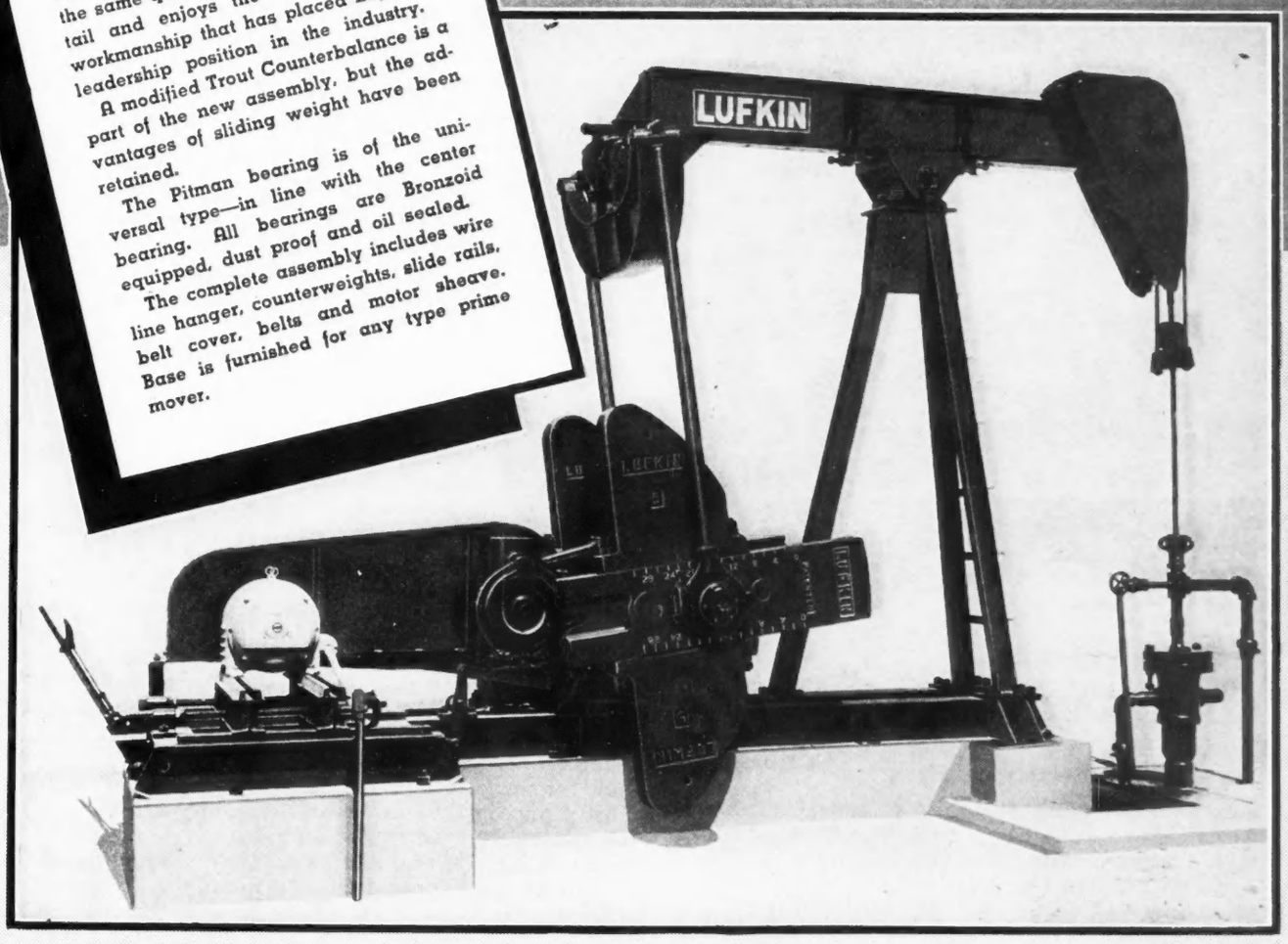
The Pitman bearing is of the universal type—in line with the center bearing. All bearings are Bronzoid equipped, dust proof and oil sealed.

The complete assembly includes wire line hanger, counterweights, slide rails, belt cover, belts and motor sheave. Base is furnished for any type prime mover.



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LUFKIN PUMPING UNITS

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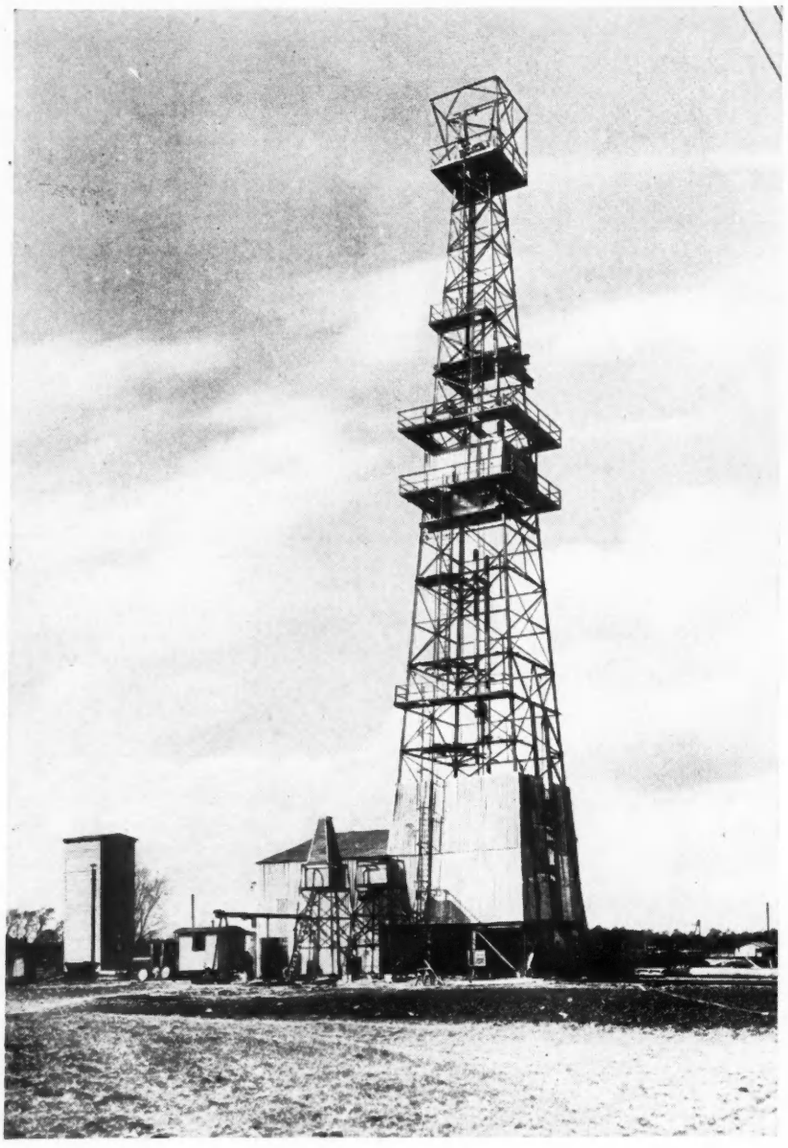

The second deepest test in Germany, drilled by Gewerkschaft-Elwerath to 11,150 feet. Germany's deepest test, Reichborung Holstein 14, reached 12,526 feet. It was drilled in Schleswig-Holstein by German Petroleum-Aktien-Gesselschaft.

of Germany and Austria combined amounted, therefore, in 1938 to 642,000 metric tons.

Zistersdorf Extended

In the past year, shortly after the annexation of Austria, two tests supported by the Reich were drilled approximately 3 kilometers north of Zistersdorf and made producers. At the same time, it was possible to get production about 3 kilometers south of Zistersdorf by means of a private company test, so that now production is assured for a length of 9 kilometers. Whether it represents one compact structure or whether this field can be regarded as three separate structures, further investigation will have to prove. In the meantime, further favorable structures are being investigated and new tests made.

Among the various drilling systems which are applied in Germany today, the rotary system is greatly preferred to the cable tool, and at this time, approximately 67 percent of all tests are drilled by the rotary system.

Free flowing wells are being throttled by valves in order to regulate gas/oil ratio, as well as to preserve natural gas pressure.

There was no pipe line construction in Germany during 1938.

Since the most productive fields in Germany have been found to have been covered by diluvial formations, investigations are primarily being made by geophysical exploration work.

Using Geophysics

The most active part in geophysical exploration since the middle of 1934 has been undertaken by the Geophysikalische Reichsaufnahme. Gravimetric, seismic, electrical, magnetic, and radioactive methods are applied. Gravity meter measurements have been connected to various pendulum stations and magnetic work serves primarily for the purpose of reconnoissance surveys. Torsion balances and seismographs are mostly applied to detail work over known regions and for the purpose of finding and outlining new structures.

The results of this geophysical plan sponsored by the Reich are not limited to solutions of geological problems alone but also to the finding of a great number of unknown structures which may be favorable for the accumulation of oil and gas. In 1937 and 1938 alone, in the middle and western part of north Germany, 107 new structures have been found, among which several had an extent of from 10 to 90 kilometers. This number is primarily salt domes. However, in these figure faults, fractured zones and salt bridges have not been included, although they may be of geologic significance. The most intensive geophysical activity is in the northwestern part of Germany, and since 1938, activities have been extended to German Austria.

Furthermore, the Oberrheintal-Graben and the Alps plateau are very important districts of geophysical activities.

Laboratories of the Geophysical State Survey examine cores of all important "Reichsbohrungen" and private tests, and consequently, supply information and material to the petroleum industry in general.

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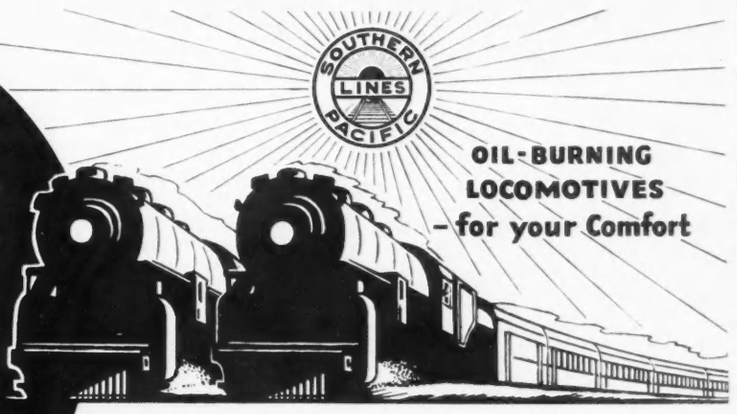

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Confiscation Is Highlight of Mexico's 1939 Activities

Production not up to Pre-Expropriation levels; labor conditions unsettled; Cardenas organization increasing oil sales to Italy and Germany.

MEXICO'S oil industry, under government control since March 18, 1938, when the $400,000,000 holdings of foreign controlled properties were expropriated, has not recovered the degree of efficiency that characterized its operation under private enterprise.

Its production for the year just closed was considerably under the annual rate of 44 million barrels maintained by the companies. There is no indication that 1939 will witness the recovery of that much oil.

Drilling, which was paralyzed by delay in granting permits during the last 1½ years of operation of that portion of the industry by private enterprise, has not kept pace with the requirements of economic exploitation. So far as government announcements are concerned, there is nothing from which to infer that a phenomenal or nominal increase in drilling will take place in 1939. But unless it does, it is safe to predict that the ultimate recovery from known reserves in Mexico will fall far short of the estimated producible unproduced oil in those reserves.

Labor Unsettled

Much has been printed on authorization of the government and the C. T. M. (Mexico's C. I. O.) of the progress made in employee morale since the oil companies were deprived of their holdings for inability to meet what they termed exorbitant demands. Students of the industry there feel that the dominance of strike notices and labor disputes in the newspapers of Mexico do not substantiate the "all's well" tenor of the announcements of the labor leaders and of the government. They do see some hope, however, in the possibility of the election of a more conservative president of Mexico in 1940. Others see a certain amount of encouragement in growing symptoms of dissatisfaction in the United States with the way the state department has been handling the matter of expropriation of American properties in Mexico.

INSISTENCE is growing in the United States that Mexico do something toward paying for oil properties she confiscated last March. Expropriation without payment has been a matter of recent concern to state and federal legislative bodies.

More than oil is involved in the $400,000,000 steal. Conservatives believe that if Cardenas and Toledano are allowed to get away with what they have done, then the outlook for all kinds of industry in Mexico is hopeless.—Ed.

Any attempt to forecast the outcome of any settlement of the expropriation matter during 1939 would be an attempt to forecast the future actions or opinions of President Lazaro Cardenas of Mexico, a thing which not even his intimate acquaintances have been able to do in the past.

One thing, however, was outstanding in the last few months. Mexico has shown a definite tendency to increase her sales of oil and petroleum products, with most of them going to Europe and specifically to Nazi Germany and Fascist Italy, with the prominence of Japan as a buyer growing steadily. Certain observers of trade balances hold this trend to be potentially dangerous to the welfare of the United States and all countries of the Americas.

Sales Since Expropriation

Mexico's petroleum exports to the world from March 19, 1938, the day following the government's expropriation of foreign owned oil properties to January 1 of this year, aggregated approximately $10,100,000 in value, a survey covering the 9½ months of governmental operation of the oil industry shows.

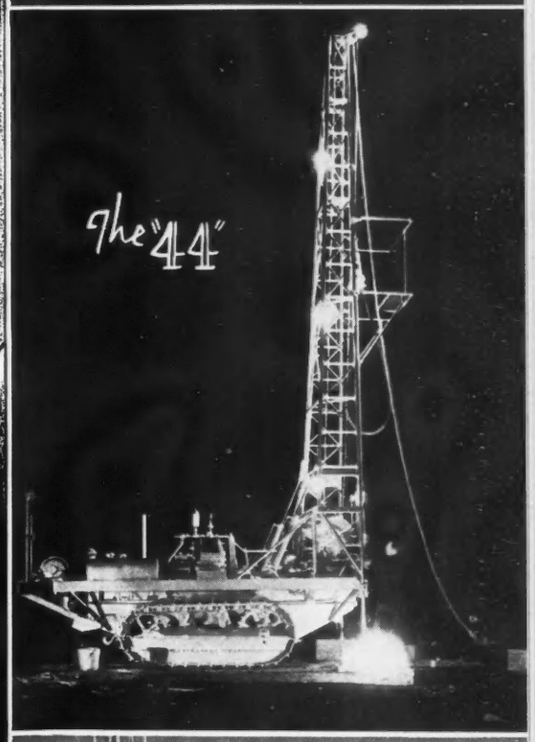
Crude exports for the period totaled 4,097,000 barrels, divided as follows: Poza Rica, 2,939,000 barrels; Panuco, 1,010,000 barrels; Southern fields, 86,000 barrels; El Plan, 62,000 barrels.

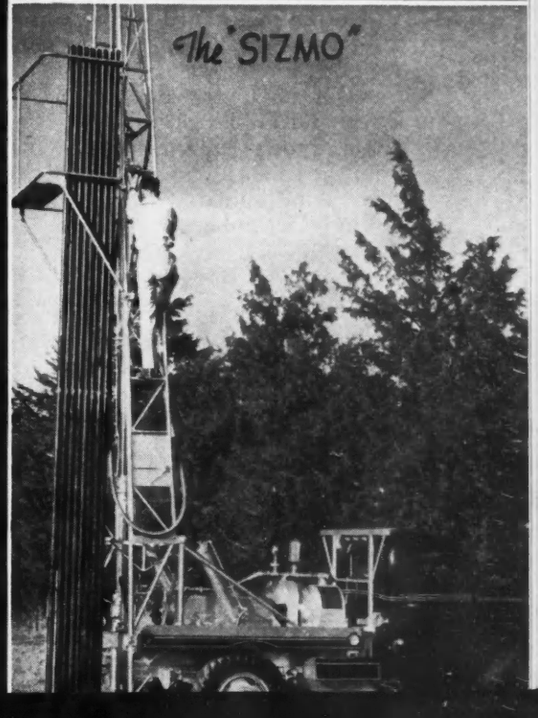
Fuel oil exports reached a total of 1,105,000 barrels, and fuel oil supplied for ship's bunkers totaled 305,000 barrels, giving a total of fuel oil export sales of 1,410,000 barrels.

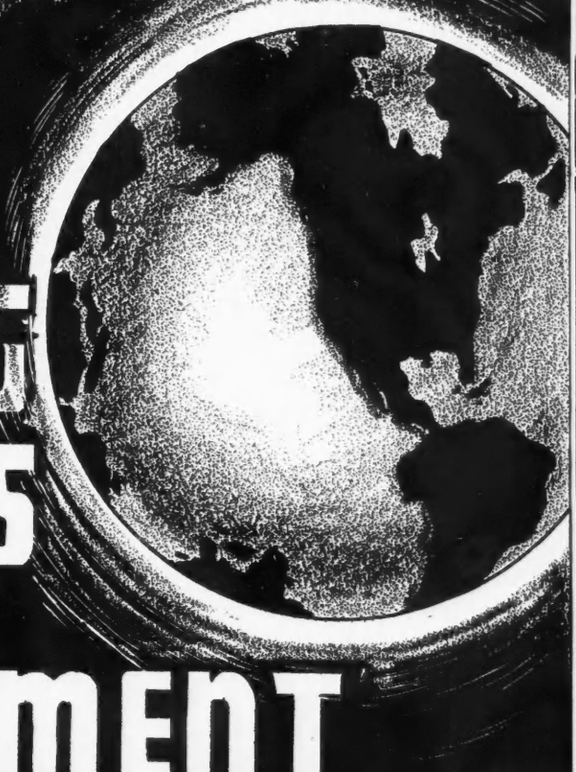
The combined total of crude and fuel oil exports as cited was 5,507,000 barrels, representing the volume of exports generally classified as crude. This shows an average of about 580,000 barrels of crude exported monthly during the nine and a half months period.

During 1937, when the Mexican

FIRST CHOICE the WORLD OVER







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industry was controlled by foreign companies, exports of crude and fuel oil totaled 13,149,000 barrels, divided as follows: light crude, 1,288,000 barrels; heavy crude, 6,171,000 barrels; fuel oil, 5,690,000 barrels. The average monthly export total for the year was approximately 1,100,000 barrels.

Business Cut in Half

Comparison of the foregoing averages shows that exports of crude and fuel oil during the nine and a half months of governmental operation have been at the rate of about half the volume of the movement during the year preceding expropriation.

Other exports during the nine and a half months of governmental operation ended December 31, 1938, totaled: asphalt, 36,000 metric tons; gasoline, 1,615,000 barrels; gas oil, 2,140,000 barrels; gas oil for ship's bunkers, 79,000 barrels.

For the 9½ months the average monthly value of exports was in excess of $1,060,000. Only during March, April, May and July was the monthly total less than $1,000,000. August and October, with more than $1,900,000 and $1,400,000, respectively, showed the largest monthly totals.

Two buyers, Davis & Company, Incorporated, New York, and Eastern States Petroleum Company, Houston, together took 67 percent of the total value of exports during the 9½ months. Davis & Company alone took 56 percent of the total for the period.

Of the grand total value of exports (approximately $10,100,000 as mentioned), the Davis takings aggregated $5,665,000, including shipments of virtually all products exported. The value of Eastern States takings (crude oil only) from August 1, when contract with the government was negotiated, to December 31, totaled $1,110,000. Davis and Eastern States together took exports totaling $6,775,000 from the time the government took over the oil industry in its entirety through December 31.

Who Bought Oil

Crude exports for the period were distributed among six buyers in all, with Davis and Eastern States by far the heaviest takers. The division of crude exports was as follows: Davis & Company, 1,658,000 barrels; Eastern States, 1,585,000 barrels; Thomas and Harrison, Limited, London, 257,000 barrels; Atlantic Refining Company, 375,000 barrels (R. B. Cochrane oil); Belgian Petroleum Refinery, 42,500 barrels; Azienda Generale Italiana Petroli, S. A., of Rome, 179,000 barrels.

Processed and Reshipped

Of the total crude exports, 1,895,000 barrels were moved to the United States. Of this, 1,585,000 barrels, or all of Eastern States takings, were shipped to the company's refinery at Houston for processing and re-shipment to European markets, and 310,000 barrels of the Atlantic Refining Company takings were consigned to Philadelphia.

The remainder of the crude exports, 2,202,000 barrels, was moved to Europe for the most part, principally to Germany and Italy, though one cargo of nearly 85,000 barrels was loaded out for Japan shortly after expropriation.

The Davis takings of crude were divided as follows: Poza Rica, 1,107,000 barrels; Panuco, 465,000 barrels; Southern, 86,000 barrels. All of the crude taken by Eastern States was Poza Rica oil.

Europe Gets Most

As in the case of crude oil, exports of other products—gasoline, gas oil, fuel oil, asphaltic residue, kerosene, asphalt—moved principally to European markets, with Germany the chief country of destination. Other markets included Belgium, Sweden, Norway, Italy, Holland. Asphalt exports were forwarded to Australia, England and various other countries.

There was some movement of various products during the latter months of 1938 to South American markets and during December the movement of crude under the arrangement with the Azienda Generale Italiana Petroli to handle Mexican oil products in Italy, announced the latter part of 1938, got under way.

This Italian company took three cargoes of crude in December, aggregating 179,000 barrels at 74 and 75 cents a barrel for a total value of more than $134,000. The shipments were as follows: 56,000 barrels of Panuco oil to Genoa, 61,000 barrels of Poza Rica crude to Gibraltar, 62,000 barrels of El Plan oil to Italy.

Sold Cheaply

Exports of all products in December reached a total value of more than $1,189,000. December crude exports totaled more than 500,000 barrels, Eastern States Refining Company with 246,000 barrels being the largest taker. Azienda Generale Italiana Petroli was second in volume of shipments with 179,000 barrels, while Davis and Company moved out 80,000 barrels.

Davis got one 75,000-barrel cargo of Panuco crude during the month for 60 cents a barrel, the lowest price yet quoted, and another small quantity of Panuco at a little above 62 cents.

Other December Exports

Other December exports included: fuel oil, more than 300,000 barrels, all of which was taken by Davis; gasoline, more than 250,000 barrels, all for the account of Davis; gas oil, 147,000 barrels, of which Davis took 80,000 barrels and Ernest Jung, 67,000 barrels, all consigned to German destination; asphalt, 5300 metric tons, divided between Davis (3900 tons) and H. A. Stendrup (1400 tons), for various European destinations.

1939 Shipments Higher

In view of contracts negotiated during the latter part of 1938, indications are that the movement of Mexican petroleum to European markets, chiefly Germany and Italy, will be in heavier volume for 1939 than during the past. The new contract with Davis & Company calls for the handling of Mexican petroleum products to the amount of $16,000,000 or more. This contract is on a barter basis, with all signs pointing toward payment for the oil in European merchandise.

Petroleum products handled by Davis under previous contracts were delivered on a payment basis of 40 percent cash and 60 percent in material. Under such an arrangement, the bulk of the Davis takings was moved to Europe with Germany, as has been mentioned, the chief market.

Of interest in connection with the December takings of crude by Davis is the lower price at which the oil was delivered by the Mexican government. While Davis took only 80,000 barrels of crude in December, he gat the product at 60 cents a barrel, with the exception of a small quantity at 62 cents plus. The price to Davis was lower in November also than that for the previous purchases, being 65 cents a barrel on all the crude delivered

to him with the exception of a small quantity on which the price was 72 cents. Davis took 161,000 barrels in November.

This reduction in crude price during the past two months on deliveries to Davis places him in the position of favored purchaser. That role, in the sale of crude, at least, was held previously by Eastern States to which oil, under its contract of August 1, 1938, with the government, has been delivered at 70 cents a barrel.

Barter With Italy

With the entry of the Azienda Generale Italiana Petroli into the export picture during December, the movement of Mexican crude to Italy under recently announced contract began. Most reliable sources place the value of the petroleum to be delivered to Italy under one contract at approximately $3,500,000. Payment to Mexico is to be made in three oil tankers, according to the terms reported.

In addition to these deals, Mexico, authentic sources report, has had under consideration barter deals with Italy and Japan to exchange approximately $3,000,000 worth of oil for rayon yarn.

The Outlook

What is to be the ultimate adjustment of the oil problem in Mexico brought on by the expropriation of the foreign owned properties March 18, 1938, remains a major question of discussion and speculation, not only in oil circles but in general business circles of the country as well. Hardly a day goes by without rumors of one sort or another, all having to do with some plan of settlement.

President Lazaro Cardenas has repeatedly said that the expropriated properties will not be returned to their former owners, and the general opinion that seems to prevail is that such a stand will be maintained by the chief executive.

On his return from Christmas holidays in the United States, American Ambassador Josephus Daniels said that nothing definite had been done in the oil question, that the oil companies had announced no definite plans. The ambassador, expressing gratification over settlement of the agrarian expropriations so far as United States nationals are concerned, went so far as to add that he saw some possibility of settlement of the oil expropriation controversy. To this he added expression of hope that settlement might be arrived at.

May Get U. S. Aid

The question is still one that is very much alive and frequent editorial comment appears in the Mexico City press. Recently, "Ultimas Noticias," afternoon paper published by the same company that publishes "Excelsior," considered one of the most conservative of the morning newspapers of the capital, carried an editorial under caption of "The Oil Case" that said in part:

Early Settlement Hinted

"During the last few weeks, it has been persistently rumored—and the rumor seems now to be reflected in the press—that the goernment of Mexico will very soon decide the conflict originated by the expropriation of the oil companies properties. This rumor is repeated by a cablegram published today by the Excelsior, and gives it some foundation and up to a certain point, even an official nature. According to that message, the Washington state department gives to understand that 'soon there will be an arrangement.' In addition, 'there is in New York a group of politicians who believe that the government of the United States should purchase all the petroleum produced by Mexico, and use it for naval purposes, in view of President Roosevelt's program of increasing the size of the fleet.'

"The publication of this news and other items which are analogous to it, coincides with Mr. Daniels return . . . and as it is not possible for one moment to admit that the problem relative to the expropriation of the oil companies can be solved without the intervention of the American government, the hope grows that we are on the eve of a solution, which is so necessary for our country, and which can be attained without insurmountable difficulties.

Says Would Help U. S.

"Never as in this instance can the 'good neighbor' policy have so practical an immediate application of such scope . . . there can be no greater help than to purchase its (Mexico's) petroleum, thus enabling it to pay the debt contracted with the expropriation. And . . . this is an evident truth . . . when the utilitarian Yankees extend their hand to us, they are working for their own best interests, with an eye to the future when unlimited oil supplies may be so important . . .

Solution Vital to Plan

"Once the petroleum conflict is solved in an equitable manner, Mexico will have eliminated one of its most troublesome questions, will have banished the clouds from its economic horizon, and can face the culmination of the vast program which has been outlined and which, had it not been for the expropriation and its consequences, would not have encountered the obstacles which still retard and make difficult its realization," the ediorial stated.

Japan Will Continue Deeper Prospecting For New Fields

Exploratory drilling in 1938 fails to increase production; record production depth established by Kinsui 32, which produced from 11,515 feet; three wildcats completed, but two were non-commercial.

By K. UYENO, Manager Field Operation Department,
Nippon Oil Company

ADDITIONAL exploratory drilling had not progressed far enough at the close of 1938 to allow that year to show any appreciable increase in Japanese production over the amount recovered in 1937.[1]

Possibly the most outstanding technical accomplishment of the year was completion of the deepest producer in Japan. Nippon Oil Company brought in Kinsui 32 from a very high pressure gas sand at 3500 meters, or 11,515 feet. The well, located on Taiwan Island (Formosa), initialled 20 barrels of 40 Beaume gravity oil and a million cubic feet of gas through a 5/8-inch choke placed at the bottom of 3-inch tubing.

Successful completion of Kinsui 32 presages a campaign of developing this deeper horizon and of looking for another still deeper. The first of exploratory tests projected to below 11,515 feet, where a richer sand is expected, is scheduled to spud in March, 1939.

Fighting Heaving Shale

A fight against heaving shale that has lasted 15 years and cost millions of yen for holes drilled in Niitsu field, Echigo province, is to be continued throughout 1939. The current attempt to penetrate the shale is Nippon Oil Company's Koguchi 108, which spudded in August in a neighborhood where the company has completed many shallow wells of commercial calibre. Present efforts are expected to come closer to succeeding, due to the fact that the company is now using a heavy duty rotary rig, mud conditioned with waterglass, and a pressure hold-down arrangement to keep the bit on bottom. Provision has been made for continuous rotation and circulation.

Koguchi 108 cemented 12½-inch casing at 550 meters (1809.5 feet) just above the heaving shale. At this point the drilling casing was changed to 8⅝-inch and 65 meters of the hole were drilled in one day, bringing the depth down to 615 meters, where it was necessary to set another string of casing because returns were lost in a 4-meter stratum of rich gas sand. At this writing the test is delayed by a fishing job, but drilling will be resumed with 5¾-inch drill stem as soon as the fish is caught. Objective depth of the test is 1500 meters.

In Nishiyama, the largest oil field in Japan, completion of Imo 96 is expected early in the year. While the objective depth of this deep exploratory test is 3000 meters, it has already penetrated several promising oil and gas sands between 1800 and 2000 meters, the present depth. A string of 11¾-inch casing protects the hole down to 1600 meters.

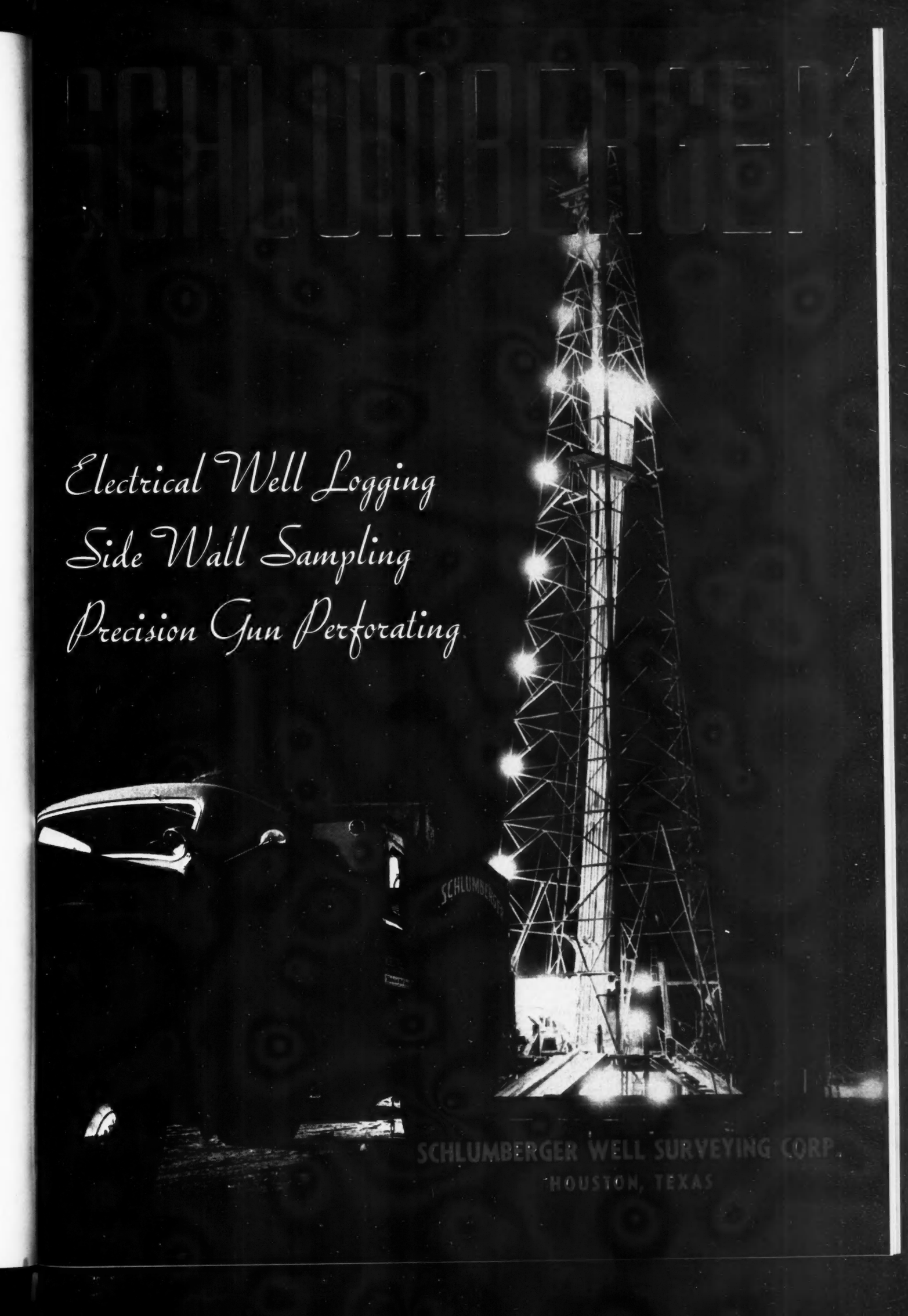
Three Wildcats Completed

Three wildcats were completed as producers during the year by Nippon Oil Company. Two of them, however, North Toyotomi Cable No. 1 in Hokkaido and Kotacki Rotary No. 1, were non-commercial, their yields being only about 10 barrels daily. The third wildcat, Niida Rotary No. 3 in Akita province was a 30-barrel well. Operations are suspended in these areas at present due to a shortage of materials.

Japan got a new conservation law in April requiring detailed reports to the government on all operations. From these data the government will determine whether the nature of the operations is such as to necessitate supervision by government engineers.

The new law provides that wells may not be drilled closer than 50 meters (164.5 feet) to a lease line. It also provides that if the government desires to have a wildcat drilled on a certain lease the operator holding that lease must drill the well. The government will, however, reimburse him for the cost of the drilling.

[1] Japan's production in 1937 was estimated by THE OIL WEEKLY at 2,689,000 barrels.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WORLD DEVELOPMENT and TECHNOLOGY

Edited by
WM. V. GROSS, Associate Editor

Mexican Situation

Daniels' protest to trading Mexican oil for German planes results in cancellation of deal; Kennedy is continuing efforts for showdown in Washington.

MEXICO turned down a proposed trade of expropriated oil for 17 German commercial airplanes, United States Ambassador Josephus Daniels is reported to have announced in Mexico City February 23. Rejection of the trade by Mexico is said to have followed an expression of displeasure by Daniels to the Mexican government over the fact that the planes were of a type that could be converted into fighting ships.

W. R. Davis, New York oil man, who has figured prominently in deals involving disposal of Mexican crude oil and who two months ago negotiated a deal for disposing of $17,000,000 worth of the oil, with Germany receiving most of it, was understood to have been in Mexico City attempting to arrange the deal for the planes.

Takings of Mexican crude by Davis have resulted in dumping considerable German pipe on the American market. Much of this pipe has entered the country at Houston for distribution to oil fields of the Texas and Louisiana coasts. Other sales of Mexican oil abroad have called for barter arrangements whereby only a portion of the payment was made in cash. A complete analysis of them since expropriation is found elsewhere in this issue in an article titled "Confiscation Is Highlight of Mexico's 1939 Activities."

Renewed efforts to secure a showdown on the Mexican oil expropriations, now nearly a year in the past, were made this week in Washington by Representative Martin J. Kennedy (Dem., N. Y.) with introduction in the house of a resolution for the recall of Ambassador Josephus Daniels from Mexico to give information as to the situation, which he charged has been characterized by "secret diplomacy" and evasion.

Little chance, however, is seen for adoption of the resolution, in view of the opposition of the state department to any open consideration of the question which, it was declared, would handicap negotiations. The belief that the measure would be tabled was widely held, based on the killing of a previous resolution sponsored by Kennedy to require Secretary of State Cordell Hull to furnish information.

At the state department, the secretary refused to comment on the resolution, saying it had not reached him, and pointed out that the former NRA administrator, Donald Richberg, was now on his way to Mexico City to negotiate with the Mexican government. The Mexican ambassador to Washington also had been called home, presumably that he might be present at the conferences.

Meanwhile, at the capitol, Representative Kennedy was outspoken in his criticism of the failure of Ambassador Daniels to secure a settlement of the oil controversy, and indicated he would continue pressing his questions until he secured answers.

Sent to Barco

Benjamin Alvarado of the department of petroleum who has been commissioned by the Colombian government to make a study of the geology of the region centering around the Barco concession in Colombia.

Ecuador shows increase in production and drilling

Despite the existence of several forces seriously deterring the promotion of petroleum enterprises, Ecuador witnessed increases in drilling and exploratory work in 1938, and the recovery of 2,245,772 barrels of crude in that year also represented an increase.

Exploration work has been carried on with great intensity, most of the activity being conducted by one large American company, one Canadian company and one British-Netherlands company, all of which had geological and geophysical crews in the field. A German firm also is said to have done some exploratory work, but the opinion in Guayaquil seems to be that this organization's concession is held fundamentally for the purpose of re-leasing should exploratory work on adjacent properties indicate likelihood of petroleum deposits underlying the German firm's holdings. At any rate, eight petroleum concessions were surveyed in 1938.

Concession contracts of the principal petroleum and mining companies were revised in 1938, resulting in increases in special and production taxes.

Anglo Ecuadorian Oilfields, Ltd., the company which produces 94 percent of the net crude recovered in Ecuador, completed 35 wells during the year. Of these two were failures. In 1937 the company completed 28, all of which were producers. Plans of this operator for 1939 call for drilling 35 wells, it is said.

Some gasoline was made from natural gas, but there was no other important use for the gas. There were no gas wells among the 1938 completions. Exports of crude during the year totaled 222,145 metric tons, valued at $1,832,336.

Production by companies in Ecuador during 1938 follows:

	Barrels
Anglo Ecuadorian Oilfields, Ltd.	2,119,495
Carolina Oil Co.	66,993
Ecuador Oilfields, Ltd.	45,339
Concepcion Ecuadorian Oilfields	10,109
International Petroleum Co.	1,577
Ecuador Tropical Oil Co.	1,424
Petropolis Oil Co.	835
	2,245,772

Likely looking structures reported found in Sind

The Burmah-Shell group, which is said to have been doing preliminary exploratory work in the rocky regions of the Indian Sind for some time, is

SS-124 (API-4)

API-3 Red-Hed

SS-40 Hyper (API-3)

API-4 Red-Hed

SS-124 Two Bar Hyper (API-4)
SS-124 Hyper a deux barres (API-4)
SS-124 Hyper de dos barras (API-4)

SS-124 Three Bar Hyper (API-4)
SS-124 Hyper a trois barres (API-4)
SS-124 Hyper de tres barras (API-4)

SS-3125 Hyper, Single
SS-3125 Hyper, Simple
SS-3125 Hyper, Sencilla

SS-3125 Hyper, Double
SS-3125 Hyper, Double
SS-3125 Hyper, Doble

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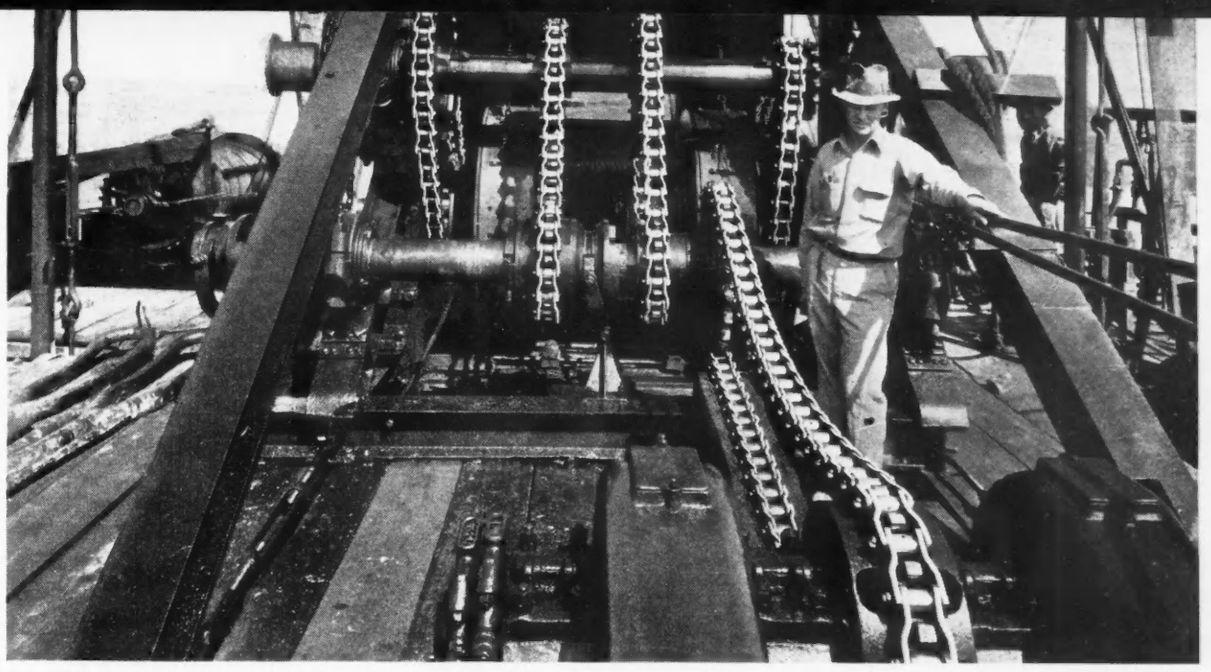

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Pitch Inches	Approx. Links in 10 Feet	Link-Belt Chain Number and Ultimate Strength, Pounds	Net Weight per Foot, Pounds	Packed for Export per 100 feet	
				Approx. Gross Wt., Lbs.	Approx. Cu. Feet
3.075	39	SS-40, 28,000	6.8	765	9
3.075	39	API-3 Red-Hed 50,000	6.8	765	9
4.063	30	SS-124 (API-4) 60,000	14.6	1,610	18
4.063	30	API-4 Red-Hed, 112,000	15.6	1,710	18
3.075	39	SS-40 Hyper (API-3), 75,000	8.3	915	9
4.063	30	SS-124 Two Bar Hyper (API-4), 130,000	16.1	1,760	18
4.063	30	SS-124 Three Bar Hyper (API-4), 170,000	16.3	1,780	18
3.125	39	SS-3125 Hyper, Single, 115,000	12.7	1,450	15
3.125	39	SS-3125 Hyper, Double, 230,000	24.0	2,700	30
3.125	39	SS-3125 Hyper, Triple, 345,000	36.0	4,000	44

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● La Link-Belt Company fué una de las primeras en perfeccionar el arte de hacer cadenas y hoy es la fábrica más grande de cadenas para transmisión de fuerza y trabajos de transporte. Las cadenas Link-Belt aquí ilustradas, se usan mucho en la industria petrolera, en todas partes del mundo. Las cadenas de la clase "SS", construídas según los patrones del A.P.I., proveen un tipo idealmente adecuado a todo servicio de perforación, sin relación de profundidad o tipo de formación del pozo petrolífero.

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Pas en pouces	Nbre. approx. de maillons par 10 metres	Numero de chaine et charge de rupture Link-Belt, en livres	Poids net par 10 metres en Kilos	Enballees pour l'exportation par 10 metres	
				Poids brut approx. en kilos	Cubic metre approx.
3.075	128	SS-40, 28,000	101.4	113.8	.08
3.075	128	API-3 Red-Hed, 50,000	101.4	113.8	.08
4.063	97	SS-124 (API-4), 60,000	217.1	239.5	.16
4.063	97	API-4 Red-Hed, 112,000	232.4	254.4	.16
3.075	128	SS-40 Hyper (API-3), 75,000	163.0	136.1	.08
4.063	97	SS-124 Hyper a deux barres, (API-4), 130,000	240.1	261.8	.16
4.063	97	SS-124 Hyper a trois barres, (API-4), 170,000	268.0	264.8	.16
3.125	126	SS-3125 Hyper, Simple, 115,000	189.2	215.7	.14
3.125	126	SS-3125 Hyper, Double, 230,000	356.8	401.7	.28
3.125	126	SS-3125 Hyper, Triple, 345,000	536.0	595.1	.40

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Paso, en pulgs	No. aprox. de eslabones por cada 10 pies	No. de cadena Link-Belt y fuerza final en libras	Peso neto por pie en libras	Embalada para la exportacion cada 100 pies	
				Peso bruto aproximado en libras	Dimension cubica aprox.
3.075	39	SS-40, 28,000	6.8	765	9
3.075	39	API-3 Red-Hed, 50,000	6.8	765	9
4.063	30	SS-124 (API-4), 60,000	14.6	1,610	18
4.063	30	API-4 Red-Hed, 112,000	15.6	1,710	18
3.075	39	SS-40 Hyper (API-3), 75,000	8.3	915	9
4.063	30	SS-124 Hyper de dos barras, (API-4), 130,000	16.1	1,700	18
4.063	30	SS-124 Hyper de tres barras, (API-4), 170,000	16.3	1,780	18
3.125	39	SS-3125 Hyper Sencilla, 115,000	12.7	1,450	15
3.125	39	SS-3125 Hyper Doble, 230,000	24.0	2,700	30
3.125	39	SS-3125 Hyper Triple, 345,000	36.0	4,000	44

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THE CHOICE OF EXPERIENCED DRILLERS

reported to have located several likely looking structures.

Credence is given the above report by an additional one which says the organization is understood to have entered into an agreement with the Sind government for a prospecting license on those areas, the government to obtain an annual revenue of nearly 350,000 rupees the first two years and one of 500,000 rupees each succeeding year the license is renewed.

In 1938 word came through that the Geological Survey of the State of Tripura, Eastern Bengal, had announced observation of several areas which might be favorable for prospecting with the drill. At that time the department said: "there are several parallel ridges about 10 miles apart running north and south with suitable anticlinal structures, numerous gas seeps and saline springs which are indicative of oil below." The statement continues: "From many considerations it has been concluded that workable oil deposits will be within 3000 feet depth. There are exposures of fossiliferous 'coal-measures' or 'Pegu' series with numerous thin seams of coal."

Several applications for prospecting licenses for petroleum and natural gases have been received by the authorities.

Details of the investigations conducted by the department and samples are obtainable from the Geological Department of Tripura State, Agartala, Bengal.

It is understood that most of the area still remains unexplored and that there are possibilities of finding other mineral deposits of economic value.

Crude exports in 1938 10,000,000 barrels above '37

Total exports of crude petroleum from the United States in 1938 amounted to 77,272,000 barrels, a 10,000,000-barrel gain over the 67,127,000 barrels shipped abroad in 1937, it was reported February 9 by the Department of Commerce.

This increased trade, the department explained, was primarily due to larger purchases by France, Japan, Italy and Sweden. France purchased 6,677,000 more barrels of crude oil from the United States in 1938 than in the preceding year, while shipments to Japan increased 5,295,000 barrels, to Italy 2,207,000 barrels and to Sweden 280,000 barrels.

On the other hand, it was said, Canada, our principal oil customer, imported 3,235,000 barrels less of American crude in 1938, this being explained by the all-time record production in Canada of 7,450,000 barrels of crude oil last year against 2,978,000 barrels in 1937. In other parts of the world, the United Kingdom failed by 600,000 barrels to equal its 1937 figure, British import statistics for the first nine months indicating that the United Kingdom was increasing its purchases of crude from the Netherland West Indies, Iraq and Venezuela and taking less from Peru, Mexico and the United States; Czechoslovakia took 229,000 barrels less, Germany 207,000 barrels less and Brazil 117,000 barrels less.

The Mexican and Cuban markets showed little change, the 1938 imports of 143,000 barrels by the former and 905,000 barrels by the latter being approximately equal to their 1937 imports of United States crude, it was stated.

Exports to the leading markets during 1938 were as follows: Canada, 24,845,141 barrels; Japan, 21,289,572 barrels; France, 16,742,506 barrels; Italy, 6,750,522 barrels; Argentina, 1,504,255 barrels; Germany, 1,223,099 barrels; Sweden, 930,225 barrels; Kwantung, 916,863 barrels, and Cuba, 904,988 barrels.

Imports during the year included 22,451,000 barrels paying a duty of 21 cents per barrel, against 25,395,000 barrels in 1937. Of the 1938 total, 20,850 barrels, or 92.9 percent, were from Venezuela, 1,600,000 barrels from Mexico and 1000 barrels from Canada.

Imports of crude in bond for manufacture and export totaled 3,599,000 barrels against 1,915,000 barrels in 1937, of which 2,717,000 barrels were from Venezuela and the remainder from Mexico.

Turkey has spent 1,500,000 pounds on wildcat efforts

Turkey's Institute of Mining Research and Geological Survey has recently worked out a five-year program for conducting its search for petroleum and Turkey has already expended approximately 1,500,000 Turkish pounds on its search for oil, says John A. Embry of Istanbul.

It is claimed that trial borings have proven the existence of important petroleum deposits in various parts of the country, but that Turkey is not yet an oil producing country.

Eight shallow wells bored in the vicinity of Murefte, in European Turkkey, ranging in depth from 125 to 300 meters, all showed evidences of oil bearing strata, but it was found that the evidence pointed to the deposits being unimportant and boring in this area was abandoned.

In the vicinity of Basbirn about 70 kilometers north of Mardin, southeastern Turkey, a well was drilled to 1327 meters, but the work had to be abandoned on account of striking a subterranean water course.

Drilling is being conducted at Mahmudbogazi, Pikal, Espenaka, Kerdut, and Alma, in the Vilayet of Siird, and a well also is is being put down in the vicinity of Diyarbekir.

Brown says financing line from Turner Valley simple

R. A. Brown, Sr., head of Brown Oil Corporation, Ltd., who returned to Calgary, Alberta, last week from London, England, declared that when sufficient Alberta oil reserves are proven, British financing of a crude oil pipe line to Vancouver, British Columbia, or to the head of the Great Lakes, will be a relatively simple matter.

"I found more people in England interested in pipe line construction than in oil, although I did not go to England to finance a pipe line," Brown said. "They are interested in pipe line investments because they have proved satisfactory and profitable in the past."

English investors who have suffered serious reverses in Mexico, Czechoslovakia and China look upon Canadian oil development as offering reasonable security from an investment standpoint, he added. English financing was obtained for six Turner Valley wells as a result of the Alberta operator's visit to England.

Two Brazilian wildcats report oil showings

Authenticated reports received February 24 from Brazil state the wildcat being drilled by the government at Lobato, a suburb of Sao Salvador da Bahia, has encountered an oil sand which yielded 100 liters (25 gallons). Preparations were being made for a production test.

The Lobato project is 300 meters from the fault scarp and on the downthrow side. Mark C. Malamphy, formerly consulting geophysicist to the Brazilian government, in a special article on Brazil's petroleum problems which appears elsewhere in this issue of THE OIL WEEKLY, tells of the Lobato area. He says that a small seepage of heavy oil exists there and that an early test drilled closer to the fault passed through two saturated sands, very thin and full of very heavy oil.

Opinion has been expressed that the present Lobato test is not of much immediate economic importance, but that it does indicate that the Brazilians are on the right track and that drilling further out might develop deeper and better sands. Location of the wildcat at Lobato was made by Glycon de Paiva, director of the Service Geologico e Mineralogico, and Irnack C. do Amaral, in charge of geophysical work and technical advisor to the National Petroleum Counsel.

Another Brazilian wildcat drilling at Ponta Verde, near Maceio in Alagoas state, has had fairly good showings of oil and gas above 658 feet. It was located by Malamphy on the geophysical anomaly described by him in the article referred to above.

Trinidad Consolidated to complete 12 wells in 1939

During the year ending September 30, 1939, Trinidad Consolidated Oilfields, Ltd., proposes to operate one drilling outfit on the Fyzabad structure in Trinidad and to complete 12 wells.

The company also intends to increase its capacity for well servicing, due to the fact that during 1938 it had as many as 24 wells off production at one time.

Current plans call for the location of two wildcats to test the structures at Forrest Park and Guaracara on the Claxton Bay leases.

Natural gas franchise awarded by Saskatoon

Walter F. Thorn and associates have been granted by the city council a 20-year franchise for supplying natural gas to Saskatoon, Saskatchewan, Canada. The agreement has been referred to the utilities board for consideration and any changes it may deem necessary, after which time it will be submitted to the electors in the form of a by-law.

Final approval of the agreement would result in construction of pipe lines from western Saskatchewan fields to the city.

International Acetylene Association meets soon

Representatives of industry from all sections of the nation will appear on the program of the thirty-ninth annual convention of the International Acetylene Association in Houston on March 8, 9 and 10.

The program will include papers on many recent and interesting developments of the oxy-acetylene welding and cutting processes and their value to industry.

Wednesday, March 8, 12:15 p.m.

The opening session at 12:15 p.m. March 8, will feature an address of welcome by J. W. Evans, vice president, U. S. Chamber of Commerce, Houston; and a keynote address by J. H. Van Deventer, editor, *The Iron Age*, New York; and an opening address by Elmer H. Smith, president of International Acetylene Association; and the Presentation of the Morehead Medal.

The tentative program follows:

WEDNESDAY 230 P. M.
First Technical Session Group—Two Simultaneous Meetings

Session "A"—"Welding and Cutting in Petroleum Refining," R. L. Dudley, president, Gulf Publishing Company, Houston, chairman. Papers to be presented are as follows: "Oxy-Acetylene Welding of Piping in Petroleum Refineries," by Henry Jouette, Magnolia Petroleum Company, Beaumont, Texas; "Welding Fittings," by E. Hall Taylor, Taylor Forge & Pipe Works, Chicago, Illinois; "Oxy-Acetylene Welding of High Pressure Piping," by A. N. Kugler, Air Reduction Sales Company, New York, N. Y.

Session "B"—"Welding and Cutting in Petroleum Production and Distribution," L. H. Courtwright, welding foreman, Reed Roller Bit Company, Houston, Texas, chairman. Papers to be presented are as follows: "Gas Welded Oil Well Casings" by G. R. Milton, Sinclair Prairie Oil Company, Arp, Texas; "Review of Latest Practices in the Pipe Line Field," by A. D. Greene, vice president, United Gas Pipe Line Company, Houston, Texas; "Maintenance of Oil Field Equipment," by C. G. Alhart, Texas Iron Works, Houston; "Oxy-Acetylene Application of Hard-Facing Materials to Drill Bits," by Charles H. Shapiro, chief metallurgist, Reed Roller Bit Company, Houston;

8:15 P. M.

Round Table Discussion—Short Forum—Demonstration meeting followed by simultaneous group meetings for open discussion of practical problems of welding and cutting. H. C. Boardman, president, American Welding Society; consulting engineer, Chicago Bridge and Iron Company, Chicago, general chairman. Demonstrations will be made of: flame hardening, hard-facing, testing, casing welding. Subjects to be discussed are: flame hardening, fire prevention and safety, non-ferrous metals, alloy steels, hard-facing, testing of welds, oil wel casing welding, salvaging and reclamation, safe ending of boiler tubes.

THURSDAY, MARCH 9
12:15 P. M.

Annual Luncheon and Business Meeting: Address by George A. Hill, vice president, American Petroleum Institute; Houston Oil Company, Houston; reports of committees, election of officers. Chairman: H. S. Smith, president, International Acetylene Association.

2:30 P. M.

Second Technical Session—"Surface Hardening and Hard Surfacing," featuring a special lecture, followed by a panel discussion led by the chairman, Dr. A. B. Kinzel, chief metallurgist, Union Carbide and Carbon Research Laboratories, Inc., New York). The paper to be presented is "Surface Hardening and Hard Surfacing," by C. E. MacQuigg, dean, College of Engineering Ohio State University, Columbus. Participants in the panel discussion will be: John J. Crowe, research engineer, Air Reduction Sales Company, New York; and Ernest E. Thum, editor Metal Progress, Cleveland.

FRIDAY, MARCH 10
8:15 A. M.

Plant Inspection Trip—Hughes Tool Company, Houston, Texas.

2:30 P. M.

Third Technical Session Group—Two Simultaneous Meetings

Session "A"—"Machine Oxy-Acetylene Cutting," A. I. Sellers, superintendent of shops, Southern Pacific R. R., Houston, Texas, chairman. Papers to be presented are as follows: "Flame Cutting with Small Machines," by Walter B. Van Wart, vice president, Wyatt Metal & Boiler Works, Dallas, Texas; "Oxy-Acetylene Shape-Cutting of Drilling Equipment Parts," by L. W. Stahl, Emsco Derrick and Equipment Company, Houston; "Plate-Edge Preparation," by J. H. Troger, Federal Shipbuilding & Dry Dock Corporation, Kearny, N. J.; "Economics of Machine Gas Cutting," by G. M. Deming, Air Reduction Sales Company, New York.

Session "B"—"General Applications of the Oxy-Acetylene Process." Papers to be presented are as follows: "Plumbing, Heating and Air Conditioning," by Frank Wallace, C. Wallace Plumbing Company, Dallas; "Safe Ending of Boiler Tubes," by Frank Page, chief boiler inspector, State of California, San Francisco; "Flame Hardening of Oil Field Equipment," by M. O'Hara, International Derrick & Equipment Company, Beaumont, Texas; "Agricultural Uses of Welding and Cutting," by Mills P. Byron, agricultural experiment station, College Station, Texas.

The round table discussions will be held at the San Jacinto High School. The group meetings will be held simultaneously, and each will be in charge of a group chairman who will be assisted by guest technical advisers. These will be recognized authorities on the subjects under discussion.

Copies of the complete program can be obtained upon request to the secretary at the office of the Association, 30 East 42nd Street, New York City.

Scouts will meet in Houston

The fifteenth annual convention of the National Oil Scouts Association of America will be held in Houston in May.

Harry Leyendecker, chief scout for Tide Water Associated Oil Company, has been named to head the arrangements committee.

Highlights of the three-day convention will be a field trip and the annual banquet. Exact date of the convention will be announced later.

A.A.P.G. will convene in Oklahoma City

The American Association of Petroleum Geologists will hold its 24th annual meeting on March 22, 23, and 24 in Oklahoma City, Oklahoma.

At the same time, March 23 and 24, the Society of Economic Paleontologists and Mineralogists will meet at the Skirvin hotel, which will be the scene for A.A.P.G. activities also, for its 13th annual meeting. The 10th annual meeting of the Society of Exploration Geophysicists is scheduled for March 21, 22, 23, with the Huckins hotel as headquarters.

Pre-A.A.P.G. Convention activities will be numerous. On the night of March 19 a group will gather at the New Chickasha Hotel, Chickasha, Oklahoma, in preparation for a field study of the Permian that will end March 21 in Oklahoma City. On that day registration will commence, various committees will be in session, and scientific exhibits will be in place. An

[*Continued on page 198*]

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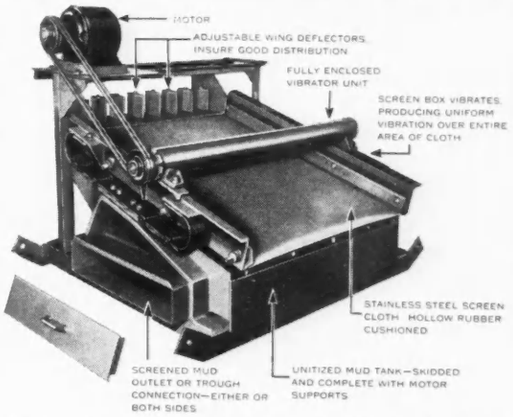
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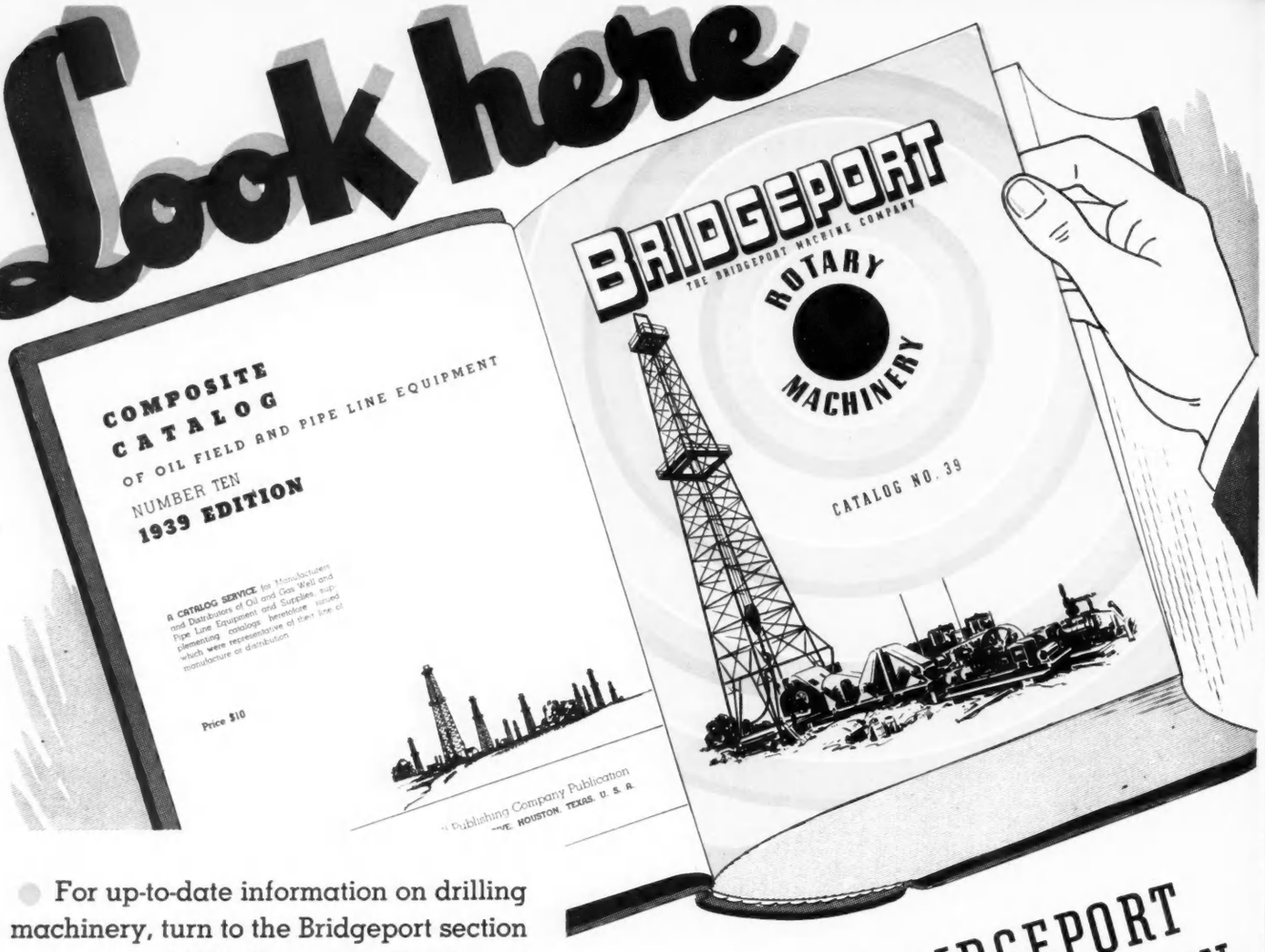
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MEN IN THE INDUSTRY'S NEWS

CHARLES U. BAY, New York, has been named president of Bay Petroleum Corporation, succeeding M. H. Robineau, resigned. Dent N. Hand, as secretary-treasurer, succeeds H. E. Armitage, who resigned as secretary. Other officers are Roland V. Rodman, vice president and general manager; V. R. Newman, general superintendent; L. L. Leabo, sales manager of the Cheyenne and Denver divisions; M. C. Bradshaw, sales manager of the McPherson division, and Ed M. Catron, production superintendent. President Bay, while touring Kansas oil fields last week following the company's annual meeting at Denver, said the firm will drill on some of its Kansas acreage in a general expansion program this year.

CHARLES A. WARNER, of Houston Oil Company of Texas, returned to Houston last week and resumed work on his soon-to-be-published book, "Texas Oil and Gas History." Warner had been attending the annual meeting of the American Institute of Mining and Metallurgical Engineers, which he served as chairman of the Domestic Production Symposium.

E. B. REESER, president of Barnsdall Oil Company, heads a group of company officials who last week started a tour of California properties. The party includes William Dewey Loucks, New York, chairman of the board; R. A. Broomfield, Los Angeles, executive vice president; James A. Dunn, Pittsburgh, vice president and secretary; D. L. Frawley, Pittsburgh, vice president, and D. R. Snow, Tulsa, vice president.

J. S. "JOE" HAELY, petroleum engineer with the oil and gas conservation division of the Kansas Corporation Commission, discussed "Methods and Application for Calculating Well Potentials" before the Kansas Oil Scouts Association meeting last week at Wichita. Arrangements for the meeting were in charge of Bob Granner, scout for the Vickers Petroleum Company, and Bob McFarland, scout for Indian Territory Illuminating Oil Company.

R. O. SMITH, O. S. Smith and J. C. R. Smith last week organized the Geophysical Electrical Surveys Company as a Texas corporation. The firm will maintain headquarters at Fort Worth.

R. R. RANSON, scout in the Seminole district for Skelly Oil Company, has been transferred from Oklahoma to Evansville, Indiana. He will work in the Kentucky-Indiana-Illinois district.

C. J. "RED" DAVIDSON, Fort Worth operator, was brought down with the flu while in Evansville, Indiana, last week.

WAITE PHILLIPS, Tulsa oil man, was honored by the New Mexico legislature with passage of a resolution by both houses of that body in appreciation for giving his ranch to the state's Boy Scouts organization.

G. H. McCARTHY, M. C. Ashley and W. H. Parker last week organized the Beaumont Natural Gas Company as a Texas corporation with headquarters at Beaumont.

R. E. MEINEIT, formerly of Lion Oil Refining Company, of El Dorado, Arkansas, has been elected president of Atlas Oil Corporation. E. R. Ratcliff was formerly president. Lion Oil Refining Company holds an option to buy controlling stocks of this company.

STANFORD PAYNE, who succeeded R. C. Granberry as chief deputy supervisor, Oil and Gas Division of The Texas Railroad Commission, on January 1 this year, was born at Ables Springs, Kaufman County, Texas, January 5, 1890.

He received his education in the rural schools of Kaufman County, Terrell High School and East Texas State Teachers College at Commerce. After leaving college, Payne taught school for 11 years in the Kaufman County schools, during which time he educated himself with the law.

In 1922 he was elected County Clerk of his native county, serving two terms, then entered the real estate business at

STANFORD PAYNE

Del Rio where he dealt with ranches, oil leases, royalties and drilling blocks.

Elected to the 44th State Legislature in 1934, Payne served one term, although he was elected, without opposition, to a second term. Before taking the oath of office for a second term, he resigned to become Director of Public Relations for the State Health Department, where he served for 16 months. He resigned from this position to enter the real estate business again, developed Sherwood Forest on the Windsor Road, one of Austin's most beautiful subdivisions.

Payne continued in the real estate business until January 1 of this year when he was appointed to his present position on the Texas Railroad Commission. His hobby is hunting and fishing.

ERNEST O. BLACK, Kansas district scout for Lario Oil & Gas Company, production subsidiary of Globe Oil & Refining Company, last week was named Kansas director of the National Oil Scouts Association. He succeeds Jim Noel, scout for Atlantic Refining Company who was recently transferred to Houston.

Assisting Black in compiling Kansas data for the National Oil Scouts Association year book will be, Pat Broach, Standard Oil Company (Indiana), crude oil purchasing division, who will handle pipe line and refining operations; Steve Powell, Atlantic Refining Company, statistical development of oil fields; Lee H. Cornell, Stanolind Oil & Gas Company and president of the Kansas Oil Scouts Association, maps of state oil areas; Joe E. Bodine, Amerada Petroleum Corporation, geophysical activities; George McLain, Carter Oil Company, wildcat operations, and Clyde W. Beebe, Shell Petroleum Corporation, land and lease operations.

R. H. BRECKON, president of Vera Oilfields, Ltd., Saskatoon, Saskatchewan, was in Calgary, Alberta, last week.

EDWARD C. SNIDER, attorney for North Continental Oil & Gas Corporation, left Calgary, Alberta, last week for Toronto and New York.

N. G. LANDRUM, Milton Brown and F. D. Jones last week organized the Landrum-Jones Oil Company as a Texas corporation with headquarters at Dallas.

HOWELL C. COOPER, retiring president and general manager of the Hope Natural Gas Company, was honored at a dinner last week in Pittsburgh over which J. French Robinson, president of the People's Natural Gas Company, Pittsburgh, presided. Among those attending the meeting were R. W. Gallagher, vice president of the Standard Oil Company of New Jersey; Frank H. Lerch, Jr., president of Natural Gas Companies, Inc.; W. A. Dougherty, counsel for Standard Oil Company of New Jersey; C. E. Gallagher, president of the East Ohio Gas Company; Ben C. Comfort, vice president of Mississippi River Fuel Company, and Robert W. Hendee, manager of Colorado Interstate Company.

E. R. SLOAN, recently resigned chairman of the Kansas Corporation Commission, will be on the opposite side of the bench at forthcoming proration hearings in the state. Sloan has been retained by Phillips Petroleum Company as legal counsel in charge of its interests in Kansas, especially as they are involved in the drafting and submission to the current legislature of amendments to proration statutes.

E. B. COOLIDGE was re-elected president of Montana Corporation and six affiliated companies when stockholders held their annual meeting at Great Falls, Montana, last week. Other officers named are: Montana Corporation: Destie Coolidge, vice president; Mina Coolidge Lowry, secretary-treasurer, and Destie Coolidge Holt and A. D. Becker, directors. Hardrock Oil Company: LaRue Smith, vice

president; Del Lowry, secretary-treasurer, and A. D. Becker and H. P. Coolidge, directors. Treasure State Pipe Line Company: William Holland, vice president; J. A. Lee, secretary; Del Lowry, treasurer; LaRue Smith, assistant secretary, and John McFayden and J. E. Moore, directors. Montana Gas Corporation: LaRue Smith, vice president; Del Lowry, secretary-treasurer; A. B. Woodahl, assistant secretary-treasurer, and H. C. Bretschneider and A. D. Becker, directors. Consumers Gas Company: LaRue Smith, vice president; Del Lowry, secretary-treasurer, and H. P. Coolidge and A. D. Becker, directors. Coolidge & Coolidge, Incorporated: H. P. Coolidge, vice president; A. B. Woodahl, secretary; Del Lowry, treasurer, and Destie Coolidge, director. Sunburst Crude Pipe Line Company: LaRue Smith, vice president; Del Lowry, secretary-treasurer; Walter J. Clark, superintendent, and H. P. Coolidge, director.

PAUL DE MOTTE, independent operator active in Posey County, Indiana, last week was called to Toledo, Ohio, by the serious illness of his father.

CLAUDE BELL is chairman of Seminole's annual Oil Men's Show, to be held in the Oklahoma city in about three months.

W. G. SKELLY, president of Skelly Oil Company, has been re-elected president of the Tulsa Industrial Corporation.

C. C. DAWES, J. Mendelcohn and C. Burns last week organized the Coral Oil Company as an Illinois corporation with headquarters at Evanston.

HOWARD (HOBBY) VAN ZANDT, formerly with Skelly Oil Company, has opened offices in Houston's Electric building.

FORD FULLINGUM has resigned as deputy supervisor for the Texas Railroad Commission in Houston. He had occupied this post since December, 1936, and prior to that he had served the commission in the Kilgore and Beeville districts since 1932. Before joining the commission he was with the Lone Star Gas Company in Texas and Oklahoma. Fullingum did not announce his plans for the future but he will remain in Houston.

A. V. MILLER, of Humble Oil & Refining Company, led a geophysical discussion at the weekly meeting of the Houston Geological Society on February 23.

E. E. MOORE, of Arrow Drilling Company of Tulsa, was in Houston the past week, apparently to arrange for the removal of some of his company's rigs into the Texas and Louisiana gulf coast district.

PAT BROACH, scout for the Kansas crude oil purchasing division of Standard Oil Company of Indiana, was confined to his home last week by an attack of the flu.

W. O. ALLEN, independent operator partially responsible for opening a new McClosky lime pool in Gibson County, Indiana, recently, plans to locate in Evansville on his return from a trip to Cuba.

ROSS H. RAYBURN, Tulsa operator, is considering locating in the Illinois-Indiana-Kentucky tri-state area. He was in Evansville last week, accompanied by Mrs. Rayburn.

R. H. FOSTER, Landreth Production Corporation, Fort Worth, is chairman of the Transportation Study Committee, named February 20 by the Independent Petroleum Association of America. Other members are E. C. Moriarity, Derby Oil Company, Wichita, vice chairman; C. H. Wright, Sunray Oil Company, Tulsa; Earl D. Wallace, Kentucky Oil & Gas Association, Lexington; and R. F. Windfohr, Nash & Windfohr Oil Corporation, Fort Worth.

C. H. KEMP, district superintendent for The Texas Company in the Glen Pool district, Oklahoma, has retired after 23 years of service. He began work with the company in 1916 as a roustabout. In 1926 he had advanced to district superintendent, a position he held until retirement. He made his home in Sapulpa.

FRANK C. ROPER and John D. Todd, geologists, have transferred their Houston offices from the Sterling to the Esperson building.

LON H. CRON, Houston, has taken his family to Cuba where Cron and Gracey Drilling Company are drilling a well for Shell Petroleum Corporation.

ROBERT W. WILKINSON was named president and managing director of National Petroleum Corporation, Ltd., Alberta operating company, when shareholders held their annual meeting in Calgary last week. Other officers are George Harris, vice president; W. Anderson, secretary-treasurer, and W. G. Ledingham, director.

M. S. BLACKBURN has arrived at Lethbridge, Alberta, Canada, from San Antonio, Texas, to open an office to serve as headquarters for a geophysical party that will work in southern Alberta this season.

JESS TOMBERLIN, independent operator formerly making his headquarters at Mounty Vernon, Illinois, moved last week to Evansville, Indiana.

ANDREW F. SCHOEPPEL, Ness City attorney, last week was named by Governor Payne H. Ratner as chairman of the Kansas Corporation Commission. He succeeds J. R. Sloan, who resigned early this month to become an attorney for Phillips Petroleum Company. The governor also named Arnold R. Jones to fill a vacancy on the commission. Hold-over member is E. E. Blincoe.

J. H. FIDDLER, with Tide Water Oil Company's land department, has opened an office in the Citizens National Bank Building, Evansville, Indiana.

JACK CLEARY, Oklahoma operator, has located in Evansville, Indiana.

DR. L. C. GLENN, Vanderbilt University, addressed the February 17 meeting of the Western Kentucky Geological Society on the "Pennsylvanian of Western Kentucky." P. S. McClure, Shell Petroleum Corporation, gave a paper on the "Tri-State Oil Fields." N. W. Shiarella, Owensboro consulting engineer, was elected to the presidency of the organization.

PAUL A. HARTMAN, vice president of the Imperial Oil & Gas Products Company, Pittsburgh, was in Evansville last week while looking over development activity in the southern section of the Illinois basin.

JOE E. WASHINGTON, San Antonio independent oil operator, was in Houston the past week, and has his eye on the Wilcox-Sparta trend.

J. T. DAWSON, formerly of Dallas, is now connected with Renwar Oil Corporation as geologist and scout, and is in Corpus Christi.

DR. W. S. ROHOLT, San Antonio independent operator, was a visitor in Houston last week.

ROY TRIBBEY, production superintendent for Magnolia Petroleum Company at Sinton, was re-elected president of the Sinton Chamber of Commerce last week. M. E. Witherspoon of Plymouth Oil Company, was re-elected as a director of the organization.

R. L. INGLISH of Dallas will be superintendent in charge of Sun Oil Company's new district production office in Corpus Christi at 406-422 Nixon Building. R. E. Bates of Arp, Texas, will be drilling superintendent; E. R. Long has been transferred from Rio Grande City to the local office; while Claymon Bengston and M. A. Spark, engineers, will work out of the local office.

H. J. PORTER, H. S. Lane and S. K. Waters last week organized the Cordele Pipe Line Company as a Texas corporation. Headquarters are being established at Houston.

T. C. STAUFFER of Sun Oil Company's land department, left his headquarters at Evansville, Indiana, last week for Philadelphia.

E. L. McCARTNEY has been appointed district manager for Twin Drilling Company at Mount Vernon, Illinois. He was formerly at Tulsa.

DONALD C. BARTON, Houston, was guest speaker Thursday night, February 23, of the Shreveport Geological Society. He spoke on "The Art of Reading Aerial Photomosaics."

CECIL HAGEN has been made chief geologist of the Texas-Louisiana Gulf Coast division of the Superior Oil Company. Hagen has 3½ years service with the company.

C. J. HAYS has been moved from Corpus Christi, Texas, to Houston to head the Texas Railroad Commission's office there. Hays has been supervisor of the commission's Corpus Christi office for some time. His transfer to Houston will fill the vacancy caused by the resignation of Fred Fullingum. J. R. Lyne, now with the commission in Palestine, will be the new supervisor at Corpus Christi.

E. R. BRANN, Ed Shoots and C. C. Hendren have organized Prairie Oil & Gas Company to engage in Indiana oil development. The firm has established headquarters at Bloomington.

CAPT. A. A. NICHOSON, personnel manager of The Texas Company, New York, declared the United States "must revert to the basic fundamentals that have always been the root of the progress and development of this country" when addressing the Gibbons Dinner Club at Oklahoma City last week.

[*Continued on page 199*]

THE WEEK'S NEWS SUMMARIZED

Proration

The Bureau of Mines sees an increased demand for petroleum in March as a result of generally improved economic conditions. The bureau estimates that an average daily output of 3,340,000 barrels will be required, 120,000 barrels above the estimate for February and slightly more than the actual demand in March of last year.

A charge that "inequalities" existed in allowables assigned to Texas fields was heard by the Texas Railroad Commission last week at a special statewide hearing, which also listened to a proposal for a new method of allocating production on the basis of well depth.

East Texans attacked allowables given certain fields, particularly Old Ocean, which has an allowable of 338 barrels per well in contrast to the 13 barrels existing in East Texas. The charge promptly brought a reply that if East Texas had not over drilled they would not have a complaint, and that Old Ocean was being drilled on 40-acre spacing, in comparison with the density of less than 5 acres in East Texas.

North Texas men urged the commission to adopt a policy of allowing one barrel for each 100 feet of depth. Subsequently it was announced there would be a change in the general proration setup of Texas prior to the next statewide hearing on March 15.

Whether or not the prospects for production control in Illinois had been benefited by a conference between Oklahoma's governor and the lieutenant governor of Illinois remained in doubt, as no announcement has been made.

Legislation

Further agitation for federal control of the oil industry came last week when the Navy Department asked that California ocean oil lands be nationalized as part of the United States defense program. It was asserted these reserves are being depleted rapidly, and that all drilling should be stopped until ownership is determined.

Wyoming's proposed measure to make oil and gasoline a public utility died a sudden death when the legislature adjourned February 19. Passage of the measure would have given the public service commission power to fix prices and otherwise regulate the industry.

New tax measures suggested to the Texas legislature would levy additional taxes on the oil industry. Texas teachers suggested a combined sales tax, the O'Daniel transaction tax, natural resources tax and a "use" tax as a means of raising revenue. Natural resource taxes would be increased about 50 percent under the measure, while oil supply equipment would also be taxed.

Another Texas bill would tax foreign oil imported into the state, apparently aimed at Mexican crude now being processed in Texas refineries.

Prices

The oil industry's markets are showing surprising strength in view of the accumulation of excessive gasoline stocks and the volume of oil seeking outlets. In fact last week there were some signs of strength being gained. Consequently, there was still some hope that improved demand expected with the arrival of spring may develop sufficiently to enable improvement.

With gasoline stocks having reached an excessive volume, there has been considerable fear of late that prices during 1939 were to be depressed, just as they were last year, when an early accumulation of gasoline caused them to suffer throughout 1938.

Stocks

Gasoline continued to pour into storage tanks at an alarming rate last week, as over 2,000,000 barrels were added despite another reduction in crude runs to stills. At present gasoline stocks have reached a total of 83,075,000 barrels, which is in excess of the 80,500,000 barrels considered as the economically desirable level. Since there is little hope for an upturn in demand before April 1, indications are that gasoline stocks may total 90,000,000 barrels by that time.

Crude and fuel oil storage were reduced considerably during the week, however. Crude stocks, after increasing steadily during the last months, declined 1,461,000 barrels to 270,753,000 barrels, and are 11.2 percent below those of a year ago.

Fuel stocks dropped 2,000,000 barrels to 136,096,000 barrels, the lowest level since last June. Nevertheless, they were still 13 percent larger than the quantity in storage at this time last year.

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Proration Picture

Bureau sees improved conditions requiring 120,000 barrels more oil daily in March . . . Inequalities in Texas proration allowables East Texans declare

Bureau says March crude demands to be greater

Generally improved economic conditions will lead to increased demand for crude oil in March, it was predicted February 24 by the Bureau of Mines.

Forecasting demand for the coming month, the bureau estimated that an average daily output of 3,340,000 barrels will be required, 120,000 barrels above the estimate for February and slightly more than actual demand in March of last year.

"During the past three months, with due allowance for unusually favorable weather conditions, a sharp upward trend is shown in gasoline demand," the bureau commented. "Improved industrial operations, coupled with low prices, has resulted in a recovery in the demand for residual fuel oil well ahead of the corresponding period in 1938 and even above the 1937 levels. However, due to recent increases in refinery runs, seasonal gasoline and fuel inventories are still considerably higher than necessary and indicate the desirability of conservative refinery operations during the remainder of February and throughout March."

Daily average crude-oil production and runs to stills during the five weeks from January 1 to February 4 were 3,300,000 and 3,230,000 barrels, respectively, the report explained. During that period total crude stocks, including heavy crude in California, declined 876,000 barrels, but foreign stocks increased 242,000 barrels, making the decline in domestic stocks 1,118,000 barrels. The daily average of this figure (32,000 barrels), added to the production, gives 3,332,000 barrels as the apparent daily average demand for January, compared with 3,270,600 barrels estimated by the Bureau, the difference of 61,000 barrels reflecting excess crude runs, which in turn resulted in over-accelerating the growth of inventories of gasoline.

March domestic demand for motor fuel is estimated by the bureau at 42,950,000 barrels, or four percent over the high demand of March, 1938, when, it was pointed out, sales were stimulated by a pending increase in freight rates.

Motor-fuel exports, based upon forecasts of exporters, are estimated at 4,000,000 barrels, making a total demand for motor fuel of 46,950,000 barrels.

"Stocks of finished and unfinished gasoline on December 31 totaled 71,680,000 barrels," the reported pointed out. "According to statistics of the American Petroleum Institute, these stocks increased about 6,500,000 barrels during January, bringing them to approximately 78,000,000 barrels as of January 31. The bureau's estimated increase for February of 4,500,000 barrels, according to present indications, will be fully realized and will bring gasoline stocks to a minimum of 82,500,000 barrels as of February 28. Believing that these stocks, augmented by current production, will be sufficient to meet motor-fuel requirements this summer, the bureau has estimated no increase in gasoline stocks during March."

With benzol and direct sales and losses of natural gasoline estimated at 1,150,000 barrels, total refinery production will be 45,800,000 barrels, which the bureau has allocated among the various districts as follows: East Coast, 5,950,000; Appalachian, 1,600,000; Indiana, Illinois, 8,120,000; Oklahoma, 2,970,000; Kansas-Missouri, 2,230,000; Texas Inland, 3,250,000; Texas Gulf Coast, 11,760,000; Louisiana Gulf Coast, 1,390,000; North Louisiana-Arkansas, 890,000; Rocky Mountain, 1,190,000; California, 6,360,000.

Natural gasoline consumption at refineries in March is estimated at 6.2 percent of the total production, or 2,840,000 barrels, and the yield of straight-run and cracked gasoline is estimated at 44 percent, application of this yield to the straight-run and cracked production of 42,960,000 barrels giving crude runs of 97,640,000 barrels, or 3,149,700 barrels daily. Foreign crude runs are estimated at 2,200,000 barrels.

March crude oil exports are estimated at 6,000,000 barrels, and the figure of 2,100,000 barrels is placed on crude used as fuel. On the basis of these estimates, total demand for domestic crude during the month will be 103,540,000 barrels, or 3,340,000 barrels, which the bureau has allocated as follows:

Texas, 1,363,900 barrels; California, 588,400 barrels; Oklahoma, 473,200 barrels; Louisiana, 259,700 barrels; Kansas, 150,300 barrels; Illinois, 125,500 barrels; New Mexico, 109,700 barrels; Wyoming, 53,600 barrels; Arkansas, 50,000 barrels; Michigan, 47,700 barrels; Pennsylvania, 45,100 barrels; Kentucky, 17,700 barrels; New York, 14,800 barrels; Montana, 13,500 barrels; West Virginia, 10,000 barrels; Ohio, 9,800 barrels; Colorado, 4,200 barrels; Indiana, 2,900 barrels.

Expect no quota change in California for March

When the Allocation Committee and the Central Committee of California Oil Producers meet February 27 and 28 respectively, no change is expected to be made in the current crude quota for the state. The Allocation Committee headed by L. L. Aubert, will meet Monday February 27, at which time it is expected to recommend that the present allowable of 600,000 barrels daily and a tolerance of 5000 barrels daily, be the schedule adopted by the Central Committee for March.

No further word has been received from the Fact Finding Committee, which made an investigation of the present voluntary curtailment program as handled by the Central Committee. It was expected that the long-awaited report would be submitted last week, but there is a strong possibility that it will be presented at the next regular meeting of the Central Committee.

East Texans attack Old Ocean allowables

A charge that "inequalities" existed in allowables assigned various Texas oil fields was hurled at the Railroad Commission at its special statewide hearing in Austin February 20, which also heard a new allocation plan proposed.

East Texans attempted to prove that Gulf Coast and Southwest Texas fields were favored over other areas, particularly East Texas wells, by being given larger allowables. This promptly brought forth a reply that if East Texas was not overdrilled operators there would not be "crying."

The attack was directed at the Old Ocean field in particular, which has a daily allowable of 338 barrels per well in contrast with 13 barrels per day to the well in East Texas. Figures were introduced into the record showing that Old Ocean produced 18,000 barrels in January in excess of this high allowable.

J. S. (Jim) Abercrombie, of Harrison & Abercrombie, principal operators in the Old Ocean field, replied by pointing out that wells were drilled on a 40-acre spacing pattern, and that if East Texas had not been overdrilled (at present to a density of less than 5 acres per well) operators in the field would have much higher allowables and would not be "hollering."

Abercrombie told of the experience the operators had in obtaining production from 10,500 feet, especially the difficulties they had with the high pressures encountered. He explained that the company was attempting to produce enough gas at the present time to reduce bottom-hole pressure to a point that would permit repressuring. The equipment now available for such operations is incapable of building up pressure sufficient to introduce gas into the sand.

During the course of his testimony, Abercrombie stated that he had drilled 25 wells in the Old Ocean field at a total cost of $5,711,903, that he had recovered $3,063,000, leaving a balance of $2,648,947. Much of Abercrombie's testimony was given over to the question of shutting in Gulf Coast wells which produce water. He testified that there were many of these wells which must be operated continuously if they are not to be killed.

The North Texas Oil & Gas Association sought to revise all state allowables through a plan offered by Lee Gray, executive secretary of the Association. He objected to pipe line pro-

ration which is now taking place, especially in the K-M-A field, and urged the commission to allow one barrel for each 100 feet of depth for a well. Thus, East Texas wells at 3600 feet would be allowed about 36 barrels each.

Gray suggested, however, that if such an allowance caused waste, it would be necessary for the commission to adjust proportionately. He assumed, likewise, that a well would be spaced on no less than 20 acres.

This plan was attacked by operators, especially in the Gulf Coast, where sands are far thicker and where operators felt that they had a reserve in excess of that found in North Texas.

Several other operators who objected to the plan, sought increases; but in most instances, observers believe that increases requested were merely a defense intended to prevent cuts.

To many observers, it appeared that much of the hearing had been prepared and staged with a view to investigating the reason for per well allowables in the Gulf Coast and Southwest Texas that were higher than those in other fields, notably in North Texas and East Texas. After the investigation of Old Ocean, however, the plan was abandoned, apparently, and operators agreed to an adjournment.

Subsequently, Commissioner Smith announced that no change in the general plan of Texas proration would take place prior to the statewide hearing now scheduled for March 15 at Austin. Apparently, he referred to the North Texas plan and a suggestion from F. W. Fischer that the commission take the total Texas allowable, giving each well its marginal allowance and prorate the balance among the wells in proportion to the reserve.

Commission figures presented at the hearing showed that the total Texas allowable had increased to 1,801,404 barrels daily on February 18. This was up approximately 19,000 barrels since February 1. After the Saturday and Sunday shutdown was applied, however, for eight days of February, the total allowable for the month will be approximately 36,916,784 barrels, the commission estimated, which is an average of 1,318,457 barrels daily. Thus, the Texas allowable will be approximately 20,957 barrels below the consumer demand for Texas oil in February, as estimated by the Bureau of Mines. Most of the increase in allowable resulted from assignments made to new wells, of which 589 had been completed during the past month.

Illinois attitude toward proration still in doubt

What the Lieutenant Governor of Illinois thought about what the Governor of Oklahoma said when they met in St. Louis February 20 remains a matter of speculation. Governor Leon C. Phillips, along with W. J. Holloway, Oklahoma representative on the Interstate Oil Compact Commission, and Art Walker, its secretary, were members of the delegation which met John Stelle, lieutenant governor of Illinois, for the purpose of outlining advantages of continued membership in the Interstate Oil Compact Commission as well as conservation laws for Illinois.

Other than brief statement to the ef-

[*Continued on page 198*]

Oil at the Capitols

Navy Department asks federal government to attain ownership of California ocean fields . . . New tax proposals would increase levy on Texas petroleum

Navy asks nationalization of California tide lands

Nationalization of the California offshore oil lands last week was asked by the Navy Department as part of the national defense program.

"Essential because the United States needs oil vitally," assertion of the government's title to the lands and the clearing off of all "persons and instrumentalities" now engaged in development was asked of Speaker of the House Bankhead in a letter from Acting Secretary of the Navy Charles Edison.

A joint resolution carrying out the request of the Navy Department was introduced February 20 by Representative Sam Hobbs (Democrat, Alabama), similar in tenor to the legislation proposed by Senator Gerald P. Nye (Republican, North Dakota), which was passed by the Senate in the last Congress but failed in the House.

Members of the House Judiciary Committee met to consider the Hobbs resolution February 24 and agreed to hold a public hearing on the measure March 22.

Members of the California delegation in Congress are expected to conduct a bitter fight against passage of the legislation, which would deprive the state of a considerable revenue which it now receives from development operations in the off-shore fields.

The California group offered determined opposition to the Nye resolution last year but were unable to prevent the committee from making a favorable report after the measure, which originally voiced the government's claim to the off-shore lands along all coasts, was amended to apply solely to California.

Referring to recent contracts whereby California and Long Beach authorized the drilling of 177 wells at Huntington Beach and Long Island, the two largest known submerged fields, Acting Secretary Edison asserted the offshore deposits are being seriously depleted.

"None of this oil is needed at the present time and its production merely aggravates an existing overproduction situation," he declared.

All drilling, Edison said, should be halted, at least until it is determined just what rights the federal government has in the lands.

"It becomes a matter of extreme importance in connection with the national defense that the oil reserves in this area should be built up rather than seriously and irreparably depleted," he told the speaker.

The purpose of the legislation introduced by Congressman Hobbs is to "declare the conservation of petroleum deposits underlying submerged lands adjacent to and along the coast of California, below low-water mark and under the territorial waters of the United States of America, essential for national defense, maintenance of the navy, and regulation and protection of interstate and foreign commerce; reserve the same as a naval petroleum reserve, subject to any superior vested right, title, or interest; and authorize appropriate judicial proceedings to assert, ascertain, establish and maintain the right and interest of the United States of America in such reserve, and to eject trespassers."

The department's request for prompt action followed out the recommendations made to President Roosevelt February 16 by the National Resources Committee in its report on energy resources and national policy.

In a discussion of national defense, the report pointed out that national policy toward ownership of petroleum and natural gas lying beneath the submerged areas off the coast of the United States between low-water mark and the 3-mile limit is a problem "which merits attention."

"Unsettled questions of law are involved, but the very existence of doubt offers an opportunity for the bold assertion of the national interest in any petroleum or natural gas reserves that may be found beneath these areas," the committee declared.

"It is one of the unfortunate errors of our national development that early in our history the public ownership of all sub-surface mineral wealth was not declared; such a step would have been so simple at an early stage and would have meant so much in terms of conservation, and it would be so complex and costly at this stage—not to speak

Will consider making Connally Act permanent

Members of a subcommittee of the senate finance committee appointed to take charge of oil legislation will meet within the next few days to consider a program for pressing the Connally bill making the "hot" Oil Act permanent law.

The subcommittee is headed by Senator Tom Connally of Texas, author of the legislation, with Senators Guffy of Pennsylvania and Townsend of Delaware as co-members.

The group plans to call hearings, requested by the National Oil Marketers Association, which is opposed to the bill, and others, but hopes, it was said, to keep them brief, feeling that practically everything that can be said about the measure has been said in past hearings.

of the wastes of irreplaceable resources that have already taken place.

"But here and now in 1939 we have one last opportunity to take steps which will reserve to the nation petroleum deposits that may be of considerable extent. In the 3rd session of the 75th Congress a joint resolution, asserting the government's rights to these deposits and setting them aside as a naval petroleum reserve, was introduced, passed by the Senate, reported with amendments by the House Committee on the Judiciary, and committed to the Committee of the Whole House. No final action was taken, owing doubtless to the pressure of other matters and to the early adjournment of the Congress.

"It is recommended that the substance of this resolution again be presented to the Congress. At this stage in our history it is sheer folly to overlook any opportunity for safeguarding the national interest in petroleum reserves."

New Texas tax proposals hit at oil industry

The house committee on Revenue, Taxation and Constitutional Amendments interrupted their joint hearings on the pension tax bills last week to take up bills concerned with other tax measures. On Tuesday, February 28, hearings on these bills will be resumed, but it appears that no bill is likely to come out of committee prior to March 6.

The Texas Teachers Association offered a new tax plan last week which would be enacted through a constitutional amendment and an enabling act. It would combine the sales tax, the O'Daniel transaction tax and natural resources tax, as well as a "use" tax, and its sponsors estimated it would raise $30,000,000.

Included in the "use" taxes would be levies on the use of manufactured oil field machinery and other manufactured items which are produced outside of Texas and which might not be affected by a transaction tax. The transaction tax of one percent, which was suggested, would apply exclusively to the last wholesale and retail sale, which is intended to prevent the pyramiding protested in the O'Daniel bill.

Sponsors of the bill said that this tax would reach 300,000 barrels of foreign oil which is brought into Texas every day, and that all refined products and wholesale gasoline would be affected. Natural resources taxes would be increased about 50 percent, they estimated.

One of the principal purposes of the bill is to allow excess to be turned to the school fund, and thus eliminate the necessity for increased ad valorem taxes for this purpose.

During the course of last week, Representative Leighton Cornett of Clarksville introduced House Bill No. 651, on income tax, which was signed by 52 members. The measure provides for a straight three percent tax on the net incomes of corporations and graduated tax of one percent to three perecnt on individual incomes, with an exemption of $2500 for married men and $400 for dependents. The tax would be one percent on the first $1000, two percent on incomes up to $5000, and three percent thereafter. Most observers were surprised at the large number of representatives who approved such a bill.

Committee approves Texas proration extension

The senate committee on mining has given its unanimous approval to the bill extending until 1941, Texas conservation laws. The companion bill, House Bill No. 18, was passed out of the committee on oil, gas and mining previously, and carries the same terminal date.

New oil measures proposed in Texas

Several new oil bills were introduced into the Texas legislature during the past week, and committees took action on other measures.

Representative Preston Anderson of San Antonio has introduced a bill in the house which provides that the "commission shall have authority to make any rule, regulation or order, or in any wise determine or hold that any mode, manner or process of refining crude petroleum oil constitutes waste if done in excess of market requirements."

A bill was introduced last week by Representative John Bell of Cuero, which completely rewrites the hot oil confiscation statute. It was reported that the bill had been carefully drawn by Attorney General Mann in an effort to prevent the abuses which had occurred under the confiscation law in the past.

A bill has been introduced in the house which permits the return of salt water to any sand from which it has been produced or any salt water bearing sand. It is expected that an effort will be made before this bill leaves the committee to have the return of salt water from oil wells "required" rather than "permitted."

Senator Clint Small has introduced a bill in the Texas legislature providing for the use of sweet gas in the manufacture of carbon black. The bill also permits the use of sweet gas for both repressuring and recycling operations, not now authorized by statute.

A bill by Representative Omar Burkett, which makes it a felony to report production from a well incapable of producing oil and gas, was favorably reported by the house committee on oil, gas and mining.

Wyoming bill to define oil business utility dies

Adjournment of the Wyoming legislature on February 19 brought death to a house-approved bill to define the oil and gasoline industry a public utility with failure to bring up the bill for a vote in the senate. Passage of the measure would have empowered the public service commission to assume jurisdiction over the industry and fix prices.

House-approval of the bill a week ago followed killing of a similar measure by the senate, indicating the proposal, declared by opponents on the floor of the house as unconstitutional, would not become law.

To Amend Leasing Act

Legislative approval was given during the closing days of the session to a joint memorial urging congress to pass amendments to the federal oil leasing act of 1920. The measure was signed last week by the governor. The memorial asks congress to "immediately and favorably consider and act upon" H. R. 2662, which proposes to extend certain oil and gas prospecting permits issued under the federal act, and H. R. 2663, which provides for the issuance of oil and gas leases "with reasonable and workable rental, royalty and bond provisions."

Copies were transmitted to the president and vice president of the United States, the speaker of the house of representatives, United States Senators Joseph C. O'Mahoney and Harry H. Schwartz, Representative Frank O. Horton, and to the chairman of the public lands committees of both branches of congress.

Drilling regulation bill before Iowa legislature

A bill to empower the Iowa state commerce commission to regulate oil well drilling was introduced in the upper branch of that state's legislature last week. A companion measure would appropriate $25,000 for the first person or firm drilling an oil well in the state with average production of 100 barrels daily for 30 days.

Approves bill for control of oil and gas industry

The senate mines committee of the Washington state legislature last week approved a bill empowering the state director of conservation and development to assume control of the state's oil and gas industry. The bill would permit licensing, production control and regulation of drilling to prevent physical waste, with administration of the measure to be paid by a tax of one-eighth of one percent of the gross value of oil or gas produced in the state. A senate bill, it awaits final approval by that body and action by the house.

Would reduce sales tax on natural gas

A senate bill pending in the West Virginia legislature would reduce the gross sales tax on natural gas from 7.8 percent to 3 percent and eliminate the surtax on other natural resources. A house measure introduced last week would require oil and gas operators to file maps and notices with the department of mines for permanent records.

Alabama legislature kills natural gas tax proposal

The house ways and means committee of the Alabama legislature last week killed, by indefinite postponement, a bill which sought to tax natural and manufactured gas 3 cents per 1000 cubic feet. John D. McQueen, Tuscaloosa attorney, appearing against the bill, described it as "prohibitory." Indefinite postponement was voted on the motion of Representative Stone, of Mobile, who declared it was equivalent to a tax of 80 cents on a ton of coal when figured on the basis of heating capacity.

Oil in the Courts

Oil firms wonder if they are next to face federal government damage suit for filing identical bids.

Identical bids vex government; may extend to oil purchasers

Major oil companies this week faced a threat of new prosecutions in the filing of a suit in New York by the Department of Justice, seeking to collect more than $1,000,000 as treble damages for losses alleged to be sustained by the government through the fixing of prices and the submission of identical bids on automobile and truck tires by 18 of the leading tire manufacturers.

In announcing the filing of the suit, the department alleged that the practice of bidding has been extensive and has embraced a number of products, including petroleum products.

"In the opinion of the department such identical bidding, whether or not supported by other evidence, creates a presumption of a combination to fix prices," it was declared by Assistant Attorney General Thurman Arnold. "Bids identical to the last penny are not normally the result of identical cost of manufacture, identical marketing cost, and identical profit percentages independently arrived at.

"It is the opinion of the department that devices used by supposedly competing sellers, whereby identical and inflexible prices result, are harmful not only to the federal government in making its purchases but also to state and local governments, and what is more important, are prejudicial to the interests of the general consuming public."

In its complaint against the tire companies, the department recited that at three different openings of bids in 1936 and 1937, the respondent companies quoted the same prices throughout for tires, the bids being identical for each of the 82 items, and that "as a result of the conspiracy the government was required to pay higher prices for its tires during these periods than it would have paid had the conspiracy not existed."

During the period from October 1, 1936, to September 30, 1937, the government bought at the identical bid prices, but following the opening of proposals for the following six months rejected all bids and negotiated a contract with Sears, Roebuck & Company at prices substantially lower than those bid by the defendants.

At the next opening of bids, the tire manufacturers submitted proposals which were not identical and which were substantially lower than the prices paid Sears, Roebuck & Company or to the defendants prior thereto, although there had been no drop in the retail prices of tires to the general public, "indicating that the drop in prices to the federal government was due to the elimination of the price-fixing conspiracy and the advent of competitive bidding."

The government therefore alleges that it was injured by the price-fixing combination to the extent of the difference between the prices it paid for tires during the period April 1 to September 30, 1938, and the higher prices it paid during the three preceding six-month periods. The suit was brought under Section 7 of the Sherman Act, providing that any person injured in his business or property by any other person by reason of anything forbidden by the act may sue the violator and recover treble damages.

It was indicated that if the government's suit against the tire manufacturers is successful, similar cases may be brought against concerns in other industries. The department listed 27 products on which identical bids had been submitted to purchasing agencies, and declared there were many more.

Review of Texas vacancy claim refused

The Supreme Court at Austin last week refused to review the judgment of the 3rd Court of Civil Appeals, which denied the state's claim to a 331-acre vacancy in the Conroe area, Montgomery County.

The state brought suit against Sun Oil Company, and several others, seeking to recover the land which is oil producing. The state lost in every court.

Market Situation

Prices steady despite recent unfavorable economic trend . . . Gasoline storage up 2,000,000 barrels last week, but both crude and fuel oil drawn upon.

Steadying tendency noted in crude—refined markets

Both crude oil and refined markets showed a steadying tendency during the past week, and only slight changes were recorded in either direction. Gasoline prices have been reduced here and there since last fall and the present quotations reflect the flattening process that started three months ago. The average gasoline price is now the lowest since January 1, 1935. The national average retail price of gasoline was less than 13¼ cents per gallon on February 1, 1939, in 50 large cities in the United States, according to the American Petroleum Institute. This average is more than one cent below the national average of a year ago. Federal, state and other taxes increased the national average on February 1, 1939, to 18.55 cents, however.

The gasoline market has held remarkably well, when the heavy stocks are considered. There is a possibility that a period of greater consumption will develop to check the downward tendency that developed last fall. A quick check in the upward swing of gasoline stocks will ease the minds of integrated companies that hope for a reduction in refinery runs.

An improved demand for crude oil has developed in a few districts, particularly in the area of heavy development. A fair demand for crude oil of all grades has been a favorable factor during the winter months. Crude oil stocks are much lower than a year ago.

Sinclair Prairie Oil Marketing Company is taking full output of wells in northeastern Oklahoma and southeastern Kansas, the area in which price reductions were posted last week. Previously output in the stripper well area had been under pipe line proration.

Arkansas has a brand new oil conservation law, the more constructive provisions of laws in other states having been used as the basis for the recent act.

Gasoline Prices

U. S. motor gasoline ranged in the Oklahoma market last week about as follows: 62 octane and below, 3⅝ to 4¼ cents a gallon; 63 to 66 octane, 3⅞ to 4½ cents; 67 to 69 octane 4⅛ to 4⅝ cents; 70 to 72 octane, 4¼ to 5 cents.

Corresponding prices in the Chicago market were 3¼ to 4 cents, 3⅝ to 4½ cents, 3¾ to 4½ cents and 4 to 4⅝ cents.

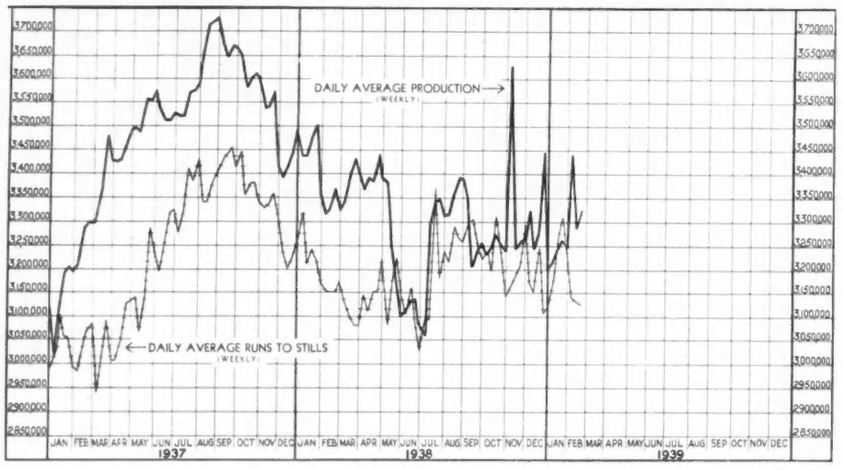
In East Texas, 60-62, 400 end point gasoline was priced generally at 4 cents a gallon.

Kerosene prices f.o.b. Oklahoma refineries ranged from 3⅞ to 4¼ cents a gallon for the 41-43 water white grade, and from 4 to 4⅝ cents for the 42-44 water white grade; and corresponding prices in the Chicago market were 3½ to 4⅛ cents and 3⅝ to 4⅜ cents.

Natural gasoline, grade 26-70, was priced generally in the Mid-Continent markets, f.o.b. refneries at 2½ cents a gallon, and sales were reported at the same price, f.o.b. Breckenridge, Texas.

Fuel oil prices were down ⅛ cent a gallon in a few instances last week. In the Chicago market range oil was priced from 3⅜ to 4 cents a gallon. The No. 1 white oil was priced from

United States Crude Oil Production and Refinery Runs



3⅜ to 3⅞ cents, and No. 1 straw from 3⅜ to 3⅝ cents. No. 2 straw was 3¼ to 3⅝ cents. No. 3 oil was 3 to 3⅜ cents. No. 5 oils were 57½ to 65 cents a barrel. The No. 6 oil was quoted at 35 to 45 cents.

All other stocks decline while gasoline increases

Although the industry has continued to hold crude production and refinery runs to comparatively low levels, continued increasing gasoline stocks greatly shade the otherwise favorable outlook. Further withdrawals have been made from crude oil stocks, and gas and fuel storage was reduced by about 2,000,000 barrels. On the other hand, finished and unfinished gasoline stocks jumped about 2,000,000 barrels during the week ended February 18.

United States crude oil production in the week ended February 18 averaged 3,324,300 barrels daily, having increased 40,600 barrels from the previous week's level, as reported by the American Petroleum Institute. The output at the new level was 1.3 percent less than in the corresponding week a year ago.

Crude runs to stills averaged 3,125,000 barrels daily, having been curtailed 5000 barrels below the previous week's level. The runs were 0.2 percent lower than in the comparable week last year.

Gasoline stocks, having steadily increased during the past few months, took another jump of 2,125,000 during the week ended February 18 and rose to 83,075,000 barrels. Although this supply is entirely too high, it is 7.5 percent under the level established in the same week a year ago.

Fuel Oil Stocks Down

Fuel oil storage was curtailed again about 2,000,000 barrels, having declined to 135,096,000 barrels, the lowest level since June of last year. Nevertheless the new figure represents a 13 percent gain over the quantity in storage held at the corresponding time last year.

Crude storage was curtailed considerably in the week ended February 18, after having been on a steady increase in the past few months. The stocks declined 1,461,000 barrels to 270,753,000 barrels, and were 11.2 percent below those of a year ago.

Santa Maria oil purchaser threatens to quite buying

Upset of a program of curtailed drilling in the Santa Maria Valley field of California resulted in a statment by a purchaser that it may find it necessary to discontinue the present purchasing arrangement on 24 hours' notice. Operators and landowners had previously entered into an agreement that no more drilling would be done until the market is able to handle more crude. Within the past two weeks a group of operators have started five new drilling projects. Should another drilling program get under way, it is feared that it will precipitate an offset campaign that would ultimately bring about increased production and thus make for market instability. The oil umpire's daily production report reveals that Santa Maria Valley field is producing around 11,400 barrels daily as against a February allotment of 18,990 barrels daily.

The California curtailment program is quite effective. For the first 15 days of February, the production was 56,000 barrels daily below the amount of oil produced during the first half of January. A portion of this decline is credited to a voluntary cut at Kettleman Hills North Dome.

January federal taxes drop slightly from a year ago

Collections from the federal oil taxes in January, with the exception of that from transportation, were close to the level of the same month last year, it was reported February 21 by the Internal Revenue Bureau.

Receipts from the gasoline tax, it was announced, were $16,429,873 compared with $16,531,890 in January, 1938, and revenue from lubricating oils was $2,199,020 compared with $2,211,295. The tax on pipe line transportation, however, returned only $792,339 compared with $1,044,468 last year.

With the exception of lubricating oils, the January collections were considerably under those of December, when $16,936,818 was received from gasoline, $2,109,251 from lubricating oils and $939,765 from pipe line transportation.

For the first seven months of the fiscal year which began July 1, last, the bureau reported, collections from

Trends of United States Production and Stocks

Figures are from American Petroleum Institute weekly reports, except those on crude stocks, which are from Bureau of Mines weekly reports

WEEK ENDED	Crude Oil Production (Barrels Daily)	Crude Runs to Stills (Barrels Daily)	Crude Oil Stocks (Barrels)	Gasoline Stocks (Barrels)	Gas & Fuel Oil Stocks (Barrels)
September 25, 1937	3,666,300	*3,455,000	307,974,000	65,620,000	116,472,000
January 1, 1938	3,436,600	3,320,000	303,468,000	77,291,000	118,660,000
January 29	3,357,650	3,170,000	304,286,000	84,844,000	118,793,000
February 26	3,322,800	3,170,000	305,167,000	90,719,000	120,958,000
March 19	3,322,550	3,080,000	306,380,000	*93,192,000	122,067,000
March 26	3,405,600	3,080,000	307,557,000	92,858,000	122,979,000
April 30	3,396,150	3,215,000	307,147,000	91,339,000	128,270,000
May 28	3,098,650	3,150,000	301,583,000	87,946,000	134,315,000
June 25	3,083,900	3,025,000	293,463,000	82,412,000	137,801,000
July 30	3,316,400	3,240,000	288,514,000	76,864,000	144,294,000
August 27	3,388,500	3,255,000	285,029,000	71,754,000	146,926,000
September 24	3,251,150	3,220,000	280,278,000	68,605,000	150,468,000
October 1	3,231,800	3,235,000	280,852,000	68,602,000	151,759,000
October 29	3,237,500	3,145,000	275,824,000	67,590,000	153,719,000
November 12	3,243,250	3,180,000	273,394,000	67,551,000	*154,666,000
November 26	3,260,900	3,295,000	270,563,000	68,628,000	153,634,000
December 10	3,245,100	3,150,000	†269,509,000	68,587,000	150,779,000
December 31	3,201,450	3,115,000	273,024,000	71,695,000	144,823,000
January 7, 1939	3,214,900	3,170,000	272,325,000	72,818,000	143,333,000
January 28	3,248,250	3,235,000	271,763,000	77,279,000	139,349,000
February 4	3,441,950	3,140,000	272,214,000	79,149,000	137,589,000
February 11	3,283,700	3,130,000	270,753,000	80,950,000	137,241,000
February 18, 1939	3,324,300	3,125,000	.....	83,075,000	135,096,000
February 19, 1938	3,369,250	3,150,000	‡304,915,000	89,774,000	119,948,000
Change in past year	—1.3%	—0.2%	—11.2%	—7.5%	+12.6%

* All-time peak. † Lowest for 17 years. ‡ Stocks, February 12, 1938

the gasoline tax amounted to $126,658,391, a loss of $2,869,300 from the $129,527,691 collected in the corresponding period a year ago. Revenue from the lubricating oils tax was $18,961,933, a loss of $1,081,957 from the $20,043,890 collected a year ago, and pipe line transportation paid $6,318,491, a loss of $1,169,466 from the $7,487,957 collected to the end of January, 1938.

180-mile gas line project mentioned in application

An application for a certificate of public convenience and necessity is being sought of the federal power commission by the General Gas Pipe Line Corporation for a proposed 180-mile 20-inch natural gas pipe line from Kentucky fields to Indiana points. The transmission line would be supplemented by approximately 40 miles of 3-, 4-, 6- and 8-inch branch lines.

Hearing on proposed Texas gas proration changes

The senate committee on mining will hold a hearing on Monday, February 27, to discuss the proposed change in gas proration laws which would allow the Railroad Commission to write orders intended to prevent the drainage of gas and pressure across lease lines.

This provision is now included in the sour gas statute, but the new bill would amend the sweet gas law for this purpose.

Crude Production

Increase of 7,055 barrels brings United States daily average for last week to 3,328,655 barrels

United States crude oil production last week remained at about the same level as in the previous week. The daily production amounted to 3,328,655 barrels, 7055 barrels above the previous week's level, and exceeded the Bureau of Mines estimated demand for domestic crude by 108,655 barrels a day.

Texas, Oklahoma and Louisiana showed small gains, which offset minor declines in California and Kansas.

Texas production increased 2500 barrels to 1,310,300 barrels daily, and was 12,800 barrels more than the Bureau of Mines recommendation, but remained 28,030 barrels daily under the state proration program.

California averaged 625,400 barrels daily, a 8800-barrel decline, but was 45,400 barrels above its indicated market demand and 20,400 barrels more than the recommendation of the Central Committee of California Oil Producers.

Oklahoma's output of 449,855 barrels daily was 5380 barrels higher than in the previous week, and 21,855 barrels a day higher than the state allowable, but 32,645 barrels lower than the federal allocation.

Louisiana showed a 3875-barrel increase, as production advanced to 266,250 barrels daily, which was 19,450 barrels more than the indicated market demand and 11,110 barrels more than the allowable prescribed by the state.

Kansas production of 150,700 barrels daily was 1925 barrels lower than in the previous week, and 3200 barrels lower than the state allowable but 2100 barrels higher than the federal allocation.

Pecos Valley field divided for proration

The Texas Railroad Commission has issued an order dividing the Pecos Valley field and creating the Pecos Valley high gravity field. All wells in the old Pecos Valley field which produce oil of 32-gravity or higher will be included in this new field.

Ten-acre spacing is provided for these wells, and proration is on acreage and per well with 50 percent allocated on each factor.

The order likewise increased the field allowable approximately 500 barrels to 1461 barrels, to supply a new demand of Comanche Pipe Line Company.

United States Crude Oil Production

Estimates Compiled by The OIL WEEKLY

DISTRICT OR STATE	Bureau of Mines Recommendation (Daily in Feb.)	State Allowable in Feb.	BARRELS DAILY FOR WEEK ENDED Feb. 25	Feb. 18
TEXAS—				
Texas Panhandle			61,800	65,100
North Texas			80,100	79,800
West Central Texas			30,800	31,100
West Texas			207,200	206,100
East Central Texas			92,400	92,500
East Texas Field			374,100	373,800
South Texas			248,300	244,600
Texas Gulf Coast			215,600	214,800
Total Texas	1,297,500	1,388,330†	1,310,300	1,307,800
CALIFORNIA—				
Long Beach			50,400	48,400
Santa Fe Springs			28,600	29,100
Huntington Beach			28,000	29,000
Dominguez			20,600	21,900
Ventura Avenue			33,100	35,300
Midway-Sunset			59,600	63,700
Kettleman Hills			63,500	57,600
Wilmington			84,000	84,700
Others			257,600	264,100
Total California	580,000	605,000*	625,400	634,200
OKLAHOMA—				
Oklahoma City			114,950	111,425
Seminole Area			98,650	96,050
Fitts			30,575	31,250
Others			206,580	205,750
Total Oklahoma	482,500	428,000	449,855	444,475
LOUISIANA—				
North Louisiana			71,050	69,275
South Louisiana			195,200	193,100
Total Louisiana	246,800	255,140	266,250	262,375

DISTRICT OR STATE	Bureau of Mines Recommendation (Daily in Feb.)	State Allowable in Feb.	BARRELS DAILY FOR WEEK ENDED Feb. 25	Feb. 18
KANSAS—				
Burrton-Haven			8,700	8,725
Russell County			22,255	22,375
Silica			8,200	9,925
Others			111,545	111,600
Total Kansas	148,600	153,900	150,700	152,625
NEW MEXICO	99,600	102,600	102,300	101,900
MICHIGAN	47,200		54,100	54,800
ARKANSAS	48,200		53,400	53,325
MOUNTAIN STATES—				
Wyoming	57,100		52,300	48,900
Montana	12,100		12,800	12,900
Colorado	3,600		4,050	3,900
Total Mountain States	72,800		69,150	65,700
EASTERN STATES—				
Pennsylvania Grade			67,500	66,800
Southern Illinois (New Pools)			144,200	143,400
Illinois-Indiana (Old Pools)			7,300	7,100
Others, Eastern			28,200	27,100
Total Eastern States	196,800		247,200	244,400
Total United States	3,220,000		3,328,655	3,321,600

* Recommendation of Central Committee of California Oil Producers.

† Daily average, considering Saturday and Sunday shut-downs.

Proration Picture

[*Continued from page 192*]

fect that the conference was satisfactory, no information has come officially from the conference. A week passed and no move had been made to pass legislation by which Illinois would continue its compact membership after September 1.

Information of no more value than rumor had it that the Illinois acting governor had changed his mind in regard to compact membership as well as conservation legislation and that he would no longer oppose measures to keep the membership and to supervise field development. It seemed unlikely, however, that he would shift his position to the point of striving to have such laws passed.

The situation in Illinois is the result of the political campaign in which the Illinois governor and its lieutenant governor were elected. Henry Horner, the governor, favored compact membership, which has been held since the body was formed in 1935. While in Tulsa in 1937 and at other times he expressed himself as favorable to conservation measures, with the reservation that these should not impose proration until Illinois oil fields are producing as much oil as the market for that area requires.

Opposed to Regulation

Lieutenant Governor Stelle was elected after a campaign of opposition to regulation of field development and well output. Previous to the opening of the current legislative session at Springfield, Governor Horner became ill and went to Florida for a rest. It is not likely that he will return to his office during the session of the legislature. This has left the office of governor occupied by a man who opposed regulation in his campaign, a situation not calculated to get support for conservation, although a change in attitude may result in no opposition in that office.

The inconsistency of retaining membership in the Interstate Oil Compact Commission when a state has no laws seeking even conservation leaves even a bill to retain membership in doubt.

This leaves both conservation measures and compact membership to move according to opinion from the oil producing areas. In these places both conservation and non-conservation has active support. Recent expressions of men familiar with the attitude in the oil country is that opposition to regulation is melting in favor of legal measures. Most buyers have been compelled to institute pipe line proration in the flush fields. This has thrown some oil into the market at prices lower than postings.

The determination to grant Illinois production the full amount of what the area requires by consumption is another varying factor. There have been expressions to the effect that the Illinois territory calls for as much as 500,000 barrels daily. This figure comes from looking at refinery capacity rather than consuming capacity. Since present Illinois fields are not slated to reach half of 500,000 barrels in output, the figure means nothing in any determination of a limit on production. With pipe line proration essential before field output reached 150,000 barrels daily, the hope of producers that they cling to the more conservative 250,000 barrels daily as normal consumption of the area looks doubtful of accomplishment.

What the backers of a program of conservation and regulation face is a legislative session moving toward its end with no bills of desirable nature under consideration. There is oil field legislation under consideration but most of it concerns requirements to compel drilling.

New Mexico allowable is increased

The New Mexico conservation commission has set the state allowable for March at 109,700 barrels daily, including a 5000 barrel daily allocation to the Artesia field for export purposes. Following the Bureau of Mines recommendation the commission increased the February allowable by 10,100 barrels daily.

Arkansas board meets first time with new name

Meeting for the first time since its creation by the legislature, the Arkansas Oil and Gas Commission, that supplants the Arkansas Board of Conservation at El Dorado Thursday set the March allowable for the regulated fields of the state as follows: Atlanta (one well), 200 barrels; Buckner (10 wells), 1750 barrels; Magnolia (10 wells), 3000 barrels; Miller County (Rodessa), 6000 barrels; Schuler (Jones sand), 15,000 barrels; Schuler (Reynolds lime), 3000 barrels; and Village (five wells), 1000 barrels

Oklahoma allowable to remain unchanged

Oklahoma Corporation Commission indicated allowable of 428,000 barrels daily, identical with February, was the March output for the state. The hearing was in progress at the close of last week with this total favorable. Adjustments are due for the St. Louis pool, Pottawatomie County, and at Oklahoma City, which may be granted increases in keeping with declines in other fields.

Louisiana cuts March allowable slightly

Louisiana Conservation Commission cut the March allowable 920 barrels to 254,220 barrels as compared with February, giving South Louisiana fields 192,320 barrels and North Louisiana fields 61,900 barrels.

North Louisiana's allowable was divided as follows: Cotton Valley: 7700 of which 2700 is to Bodcaw sand wells, 5000 to Holloway sand wells; Lisbon, 5500; Rodessa, 28,000; Shreveport, 2700; and remaining fields, 18,000. Lisbon was cut 2250 barrels and Rodessa was cut 1000 barrels. Heretofore Shreveport field's allowable has been 300 barrels daily for each well but individual wells allowables probably will be issued for March. Shreveport has 12 wells.

A.A.P.G. Program

[*Continued from page 187*]

informal dinner of the research committee, under A. I. Levorsen, and all others interested, will be held at 6:30 p.m., at the Skirvin, followed by open meeting in which "The Tectonic Map of the United States" will be discussed.

Activities of the convention proper have been divided according to geologic provinces. Numerous papers will be presented and members are urged to take advantage of the ample time which will be allowed for discussion.

On March 25 Charles E. Decker will conduct a one-day field trip to study the Arbuckle Mountains and the Ardmore Basin. The cost of all field trips will be prorated among those attending.

Pacific Coast A.P.I. meets on April 11

Announcement has been made by H. C. Pyle, chairman of the Pacific Coast District of the American Petroleum Institute's Division of Production that the regular spring meeting will be held Tuesday, April 11, in the Biltmore Hotel at Los Angeles, California. Plans for the meeting contemplate an all-day session with a dinner meeting in the evening.

Arrangements are in charge of W. L. Heater, of Baroid Sales Company, Los Angeles, chairman of the Arrangements Committee, and Frank Morgan, of Richfield Oil Corporation, Los Angeles, chairman of the Program Committee.

Other members of the committees are: Arrangements, R. P. McKey, Petroleum World; J. W. McPhee, Lane-Wells Company; Taber Muller, A. O. Smith Corporation; Warner Parker, Oil Well Supply Company, and J. W. Schmid, The Republic Supply Company of California, all of Los Angeles; F. R. Schmieder, Shell Oil Company, Long Beach, California; and Alvin Zwernaman, Axelson Manufacturing Company, Vernon, California.

Program, W. H. Farrand, The Texas Company; Wendell M. Jones, Petroleum Equipment Company, Paul E. Lehr, Shell Oil Company; and E. K. Parks, all of Los Angeles; Joe Robinson, Union Oil Company of California, Compton, California; J. H. Sargent, Kettleman North Dome Association, Avenal, California; and F. R. Schmieder.

Indiana-Illinois association annual meeting June 3

The seventh annual petroleum conference of the Illinois-Indiana Petroleum Association has been scheduled for June 3 in Robinson, Illinois, it has been announced by Lee Mulvihill, executive secretary of the association.

Eastern A.P.I. meets at Pittsburgh in April

D. T. Ring, of The Ohio Fuel Gas Company, Columbus, O., has been appointed chairman of the program committee which is developing plans for the spring meeting of the Eastern District of the American Petroleum Institute's Division of Production to be held in the William Penn Hotel at Pittsburgh, Pennsylvania, April 4 and 5 next.

John A. Thompson, of Belmont Quadrangle Drilling Corporation, Bradford, Pennsylvania, is chairman of the registration committee. T. H. Myers, of Carnegie Natural Gas Company, Pittsburgh, is chairman of the committee on arrangements.

Other members of the program committee include O. W. Van Petten, of Columbian Carbon Company, Charleston, W. Virginia, and J. J. Schmidt, of East Ohio Gas Company, Cleveland, Ohio.

Oklahoma City arranging for A.P.I. district meeting

Arrangements for the annual meeting of the Mid-Continent District of the American Petroleum Institute, Division of Production, Oklahoma City, April 18 and 19, have been started by the Oklahoma City Chapter, which will play host.

Tom Hamilton, Phillips Petroleum Company, has been named program chairman. Mike Birmingham, Indian Territory Illuminating Oil Company, is chairman of the committee on registration and publicity. Entertainment will be provided by a committee headed by Herb Goodpastor, Kerlin Oil Company.

Officials of the Oklahoma City Chapter are: C. O. Rison, Indian Territory Illuminating Oil Company, chairman; Herb Goodpasture, vice chairman, and Mike Birmingham, secretary and treasurer.

Houston A.P.I. to meet at Texas State Hotel

New operating problems of the industry have been created in recent years through the discovery of many deep fields that yield a high gas-distillate product. Both the economical and operating phases of these distillate, or condensate, producing fields are to be discussed at the next meeting of the Houston Chapter of the American Petroleum Institute.

The meeting is to be held at 7:30 p.m., Tuesday, February 28, in the Texas State Hotel.

Jack Vaughn, of Tide Water Associated Oil Company, is to speak on the mechanical design of distillate recycling plants.

Stuart Buckley, of Humble Oil & Refining Company, is to discuss the economical factors encountered in the operation of such fields.

Studies have emphasized the importance and necessity of gas recycling and pressure maintenance in fields of this type. Apparently this is necessary to prevent excessive gas wastage and also to recover the largest ultimate yield. Since both of the speakers have made thorough studies of the problem, they will answer many of the questions operators are still wondering about.

Warren Baker, editor of THE OIL WEEKLY, will highlight current economic and news events of the industry.

Willis Storm heads South Texas geologists

New officers of the South Texas Geological Society for the ensuing year were named at a recent meeting of the organization in San Antonio.

Willis Storm, geologist for Petroleum Royalty Corporation, was elected president, replacing W. A. Maley of Corpus Christi. Dale L. Benson, with Sinclair-Prairie Oil Company, was named vice president. Ira Brinkerhoff of San Antonio, Stanolind Oil & Gas Company, was elected secretary and treasurer. He replaces C. C. Miller of Corpus Christi. E. L. Porch of San Antonio was elected a member of the executive committee.

The new officers will not be installed until the April meeting of the group. Chairmen and members of special committees such as the nomenclature committee will not be named until then.

Men in the Industry's News

[*Continued from page 190*]

ROBERT C. BERKSTROM, director of a Works Progress Administration mineral survey being conducted in cooperation with the Arkansas geology department, predicted a bright future for the state's oil industry at Little Rock last week. He said existence of large natural gas fields in North Arkansas is indicated by survey findings.

W. G. FOSTER, California petroleum engineer, presented an illustrated discussion on "Hydraulic Oil Pumping" at a meeting of the Calgary branch of the Engineering Institute of Canada held last week in Alberta's oil capital.

H. S. McQUEEN, a member of the Missouri Geological Survey staff at Rolla, will discuss "The Geology of the Forest City Basin" at the annual meeting of the American Association of Petroleum Geologists to be held March 23 and 24 at Oklahoma City.

F. F. HAMILTON, Tulsa, Oklahoma, and C. W. Biggs, Brownsville, Texas, plan to establish headquarters at Evansville from where they will direct exploration of several tracts they hold in the southern section of the Illinois basin.

MAX PRAY, R. Tift and S. F. Glass last week organized Central Pipe Line Company. The firm will handle crude in the southern Illinois basin area and maintain headquarters at Centralia.

DR. G. E. ANDERSON, of the University of Oklahoma's school of geology, discussed "Origin of the Color Line in Permian Sediments from Kansas to Oklahoma" before the technical meeting of the Oklahoma City Geological Society last week.

The Tulsa oil man emphasized that the industry he represents is owned by the people, who have invested their savings in the hope of receiving dividends, and not by a "group of greedy, silk hat octopuses who have their offices in a place called Wall Street, where they are rolling in wealth."

"Perhaps no product has done more to change the lives of our people than oil," he added. "Perhaps none has contributed more towards the social and industrial welfare of our nation. Oil is operating your automobile, hauling your hogs, cattle and farm products to market, cultivating your farms, operating your refrigerators and your incubators. And oil is doing something more for Nebraska. It is the source of most of your state taxes."

R. A. BROWN, Sr., head of Brown Oil Corporation, Limited, Brown, Moyer & Brown, Limited, and several associated companies active in Alberta, stopped in Ottawa, Ontario, last week en route from London, England, to Calgary.

DIED:

CLARENCE McMANUS, 53, Nowata, Oklahoma, oil man, died February 20 of a heart ailment. McManus had spent 18 years of his career in South African and South American oil fields.

FRED A. RAY, 46, of Fern, Pennsylvania, died February 9. He was a driller of long experience in the Appalachian fields and was employed on the first Oriskany sand well in New York State.

FRANK H. HOYT, 77, retired purchasing agent for Standard Oil Company, died February 9 at Fort Lauderdale, Florida, where he had gone to spend the winter. A member of the Engineers Club of New York, he made his home in Queens. Surviving are his wife, one son, Edmund H. Hoyt, representative of Socony-Vacuum Oil Company at Soochow, China, and two daughters.

WILLIAM M. PURSIFULL, 55, manager of the Interstate Oil & Gas Company, died February 16 in a hospital at Louisville, Kentucky, after an illness of four months. Making his headquarters in Owensboro, he had been identified with Western Kentucky oil development for 12 years. Burial was at Hazard, Kentucky, where Pursifull served as mayor before coming to Owensboro.

MICHAEL HOLLORAN, 79, pioneer drilling contractor in Indiana, Kentucky and Illinois fields, died at his home in Indianapolis February 14 after a brief illness. He had retired 10 years ago.

ORVYLE DUKE, driller, who lived in Cement, Oklahoma, was killed February 16 when his clothing caught on machinery while drilling a well east of Benton, Illinois.

Finding Oil for 8/10c per Barrel

ANALYSIS of INDEPENDENT'S discovery record during the past six years indicates that oil reserves have been located for INDEPENDENT'S clients at an average estimated cost of less than 0.8 cents per barrel for seismograph exploration.

The estimates of oil reserves upon which this analysis is based apply only to fields where INDEPENDENT did the original exploration work which led to the discovery, and are taken from Oil and Gas Journal, Oil Weekly and similar sources.

We have eliminated from this estimate all reserves obtained by INDEPENDENT'S clients, because of INDEPENDENT surveys, where the discovery well was drilled by another company.

This cost is based upon more than 600 crew months of operations in 22 states in the United States, and in several areas outside the United States. The working conditions varied widely, as did the desirability of the prospects.

In presenting these figures INDEPENDENT wishes to emphasize that such low cost discovery is possible, not alone because of efficient seismograph operation, but because of the intelligent direction of the exploration progress by the geological departments of INDEPENDENT'S clients.

Our seismic exploration service is offered on short or long term contracts to oil companies, independent operators and governments. Cost estimates furnished without obligation.

CLIENTELE

Space does not permit a full listing of INDEPENDENT'S clients, but the 38 companies shown here are representative of the character of INDEPENDENT'S clientele.

Adams Oil and Gas Company
Argo Oil Company
Arkansas Natural Gas Corporation
Atlantic Refining Company
Barnsdall Oil Company
The British American Oil Producing Company
The Carter Oil Company
Continental Oil Company
Darby Petroleum Corporation
Eason Oil Company
Freeport Sulphur Company
General Crude Oil Company
General Petroleum Corporation of California
Gulf Oil Corporation
Houston Oil Company of Texas
King Oil Company
Louisiana Land & Exploration Company
Magnolia Petroleum Company
Mexican-Sinclair Petroleum Corporation
Michigan Devonian Petroleum Company
Minnesota Northern Power Company
The Ohio Oil Company
The Palmer Corporation
Pan-American Production Company
The Pure Oil Company
Republic Production Company
Shell Petroleum Corporation
Skelly Oil Company
Socony-Vacuum Oil Company, Inc.
Standard Oil Company of Kansas
Stanolind Oil and Gas Company
Sun Oil Company
The Superior Oil Company
Tide Water Associated Oil Company
Union Oil Company of California
United North and South Development Company
United Natural Gas Company
Wellington Oil Company of Delaware

Send for this valuable 32-page booklet describing INDEPENDENT'S organization, equipment, methods and past record. This booklet will be mailed without cost, upon request.

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HOUSTON TEXAS

POINTING THE WAY FOR THE DRILL

Experienced in 22 States and in Foreign Fields

WEEK'S DRILLING HIGHLIGHTS

Illinois

Russell Township field of Lawrence finished a 23 million cubic foot gas well, second largest in the field. Devonian lime production was indicated as a possibility for the old shallow Tamalco pool, Bond County.

Kentucky

Henderson County got a new McClosky sand pool 12 miles from Niagara shallow production. Performance of an east outpost indicates an extension for Gilmore, eastern Henderson County.

Indiana

A 20-foot core of good McClosky in an offset to the discovery confirmed the recent Cooper strike in Gibson County.

Texas Gulf Coast

Ten tons of special mud were required to prevent a deep sand blowout in a Buttermilk Slough wildcat, Matagorda County. The best well yet completed there extended League City, Galveston County, south; a west extension is indicated also. Northeast of Fairbanks production an outpost has cored a large body of gas and distillate sand.

North Texas

Filling 1000 feet with oil on formation test, a west central Clay County wildcat indicated a new Strawn sand pool. Nine discoveries have been made in the district this year.

West Texas

A large completion added encouragement to development of the northwest extension sector of Church Fields area, Crane County. North Cowden will get a half mile east extension. Dean pool, Cochrane County, got a major extension; Wasson, Yoakum County, got a minor extension east. Five miles southwest of Chittenden pool a wildcat indicated a field for Jones County.

East Texas

Talco, Titus County, got a 3100-foot extension east when a Paluxy pumper yielded 20 barrels hourly.

New Mexico

The second failure was recorded for the Repollo pool of Lea County. Nine new operations were announced in Lea County, including tests in five fields and a wildcat. Production allowable was increased during February and is scheduled for further boost in March.

Arkansas

Three deep wildcats were abandoned during the week, but ten starts was an unusual boost in new work.

North Louisiana

The second deep well in at Shongaloo makes distillate. Five tests in the Vivian sector of the Pine Island area showed up with salt water and have retarded the interest aroused by two Tokio oil producers completed there recently.

Oklahoma

Ramsey pool's Wilcox sand production has been extended outside the 640-acre community block north and east. The north offset to the discovery well in Hillsdale, Garfield County, failed to show saturation.

Kansas

Production in Allon field, Russell County, was moved a half mile east by a Lansing-Kansas City lime completion. A mile south of Leesburgh pool, Stafford County, an outpost continues showing favorably.

South Louisiana

East of St. Bernard Parish, a wildcat has logged oil showings below 10,600 feet. Chalkley field of Cameron Parish recorded its first profitable well. The southwest flank of Jennings got a new deep sand.

Southwest Texas

Townsite drilling for Aransas Pass is in prospect as production has been moved nearer to the town limits. Riverside in Nueces County gets a setback with the offset to the discovery oil well making salt water and another test running low. A try for Vicksburg production in the Samfordyce field is under way. A new repressuring method is being attempted in the La Blanca field where there has been much damage from a wild well.

Comparison of Permits Granted for New Wells

STATE	Week Ending Feb. 25	Total this Mo.	Total this Year	Total this Date Last Year	1938 Year Total
Arkansas	10	15	31	40	247
California	13	58	159	201	1,146
Louisiana	48	128	194	232	1,214
Kansas	19	82	197	296	1,453
Michigan	17	83	146	90	953
Oklahoma	37	136	295	352	1,978
Texas	123	873	1,556	2,208	12,369
Total	267	1,375	2,578	3,419	19,360

Summary of Wells Completed in the United States Week Ending February 25, 1939

	Completions	Oil Wells	Gas Wells	Failures	Initial Production	Total, 1939	Total this Date, 1938
Alabama	....	....	....	....	.....	1	....
Arkansas	8	3	....	5	1,275	45	36
California	16	12	....	4	8,085	161	190
Colorado	....	....	....	....	.....	2	2
Florida	....	....	....	....	.....	....	....
Illinois	72	62	....	10	19,032	673	124
Indiana	5	....	3	2	.....	23	13
Kansas	27	17	2	8	25,416	202	340
Kentucky	12	3	5	4	440	119	117
Louisiana	13	9	1	3	3,346	145	193
Michigan	21	9	....	12	7,245	178	137
Mississippi	....	....	....	....	.....	1	5
Montana	6	5	....	1	395	20	7
Nebraska	....	....	....	....	.....	....	....
New Mexico	11	11	....	....	5,829	108	81
New York	*8	7	1	....	44	*83	*113
Ohio	15	1	11	3	10	145	166
Oklahoma	39	28	1	10	19,222	300	372
Pennsylvania	*16	14	1	1	17	*200	*366
Texas	160	111	....	49	132,728	1,637	2,105
Utah	....	....	....	....	.....	....	....
West Virginia	....	....	....	....	.....	77	158
Wyoming	2	2	....	....	4,620	32	13
Total this week	431	294	25	112	227,704	4,152	4,538
Total last week	543	390	27	126	201,190	....	....
Total this year	4,152	2,836	300	1,016	.....	....	....

* Includes water-intake and pressure wells.

Oklahoma Fields

Ramsey's Wilcox development moves outside block. St. Louis and Sac and Fox continue most active.

Tulsa.—Development of the Ramsey Wilcox sand field, Payne County, has moved outside of the community block of 640 acres both north and east. The first well along the north line of the block was completed last week for 10,135 barrels potential. It was Ramsey 8, NE NW NW 18-18n-2e, drilled by Mid-Continent Petroleum Corporation. This concern will drill the location to the north, Simpson 1, SE SW SW 17-18n-1e, in partnership with Carter Oil Company. Both are interested in the community block, but the Simpson lease is not a part of the unit.

The field now has 21 producing wells, 20 within the original block and one across the block line to the east. This well, Walters 1, SWc NE 18-18n-1e, has not been given a potential test by Stanolind Oil & Gas Company, but it is flowing on preliminary tests. Two wells are drilling outside of the block on the east.

St. Louis area in Pottawatomie County and the Sac and Fox field, Lincoln County, are the leaders in Oklahoma activity.

So far the Arbuckle lime has failed to show saturation in the north offset to the discovery well at Hillsdale, Garfield County. Champlin Refining Company is below 7100 feet in Boehm 2, C N½ SE NW 4-24n-8w, north offset to the discovery well, which is producing from Second Wilcox sand, which was found non-productive in the north offset.

A Wilcox sand test for the old Garber pool, Garfield County, will be drilled by Continental Oil Company on the southwest side of the field.

Drilling was pushed outside of the 640-acre community block to the north at the Ramsey field, Payne County, following completion of Ramsey 8, NE NW NW 18-18n-2e, for potential of 10,135 barrels from Wilcox sand between 4667 and 4693 feet. This well was the first completion along the north line of the block being operated by Mid-Continent Petroleum Corporation.

This concern staked location for Simpson 1, SE SW SW 17-18n-2e. Although the lease is not part of the block it will be operated by Mid-Continent Petroleum Corporation as owner of three-fourths of the working interest, the other being owned by Carter Oil Company.

One well is producing outside of the community block to the east, Walters 1, SWc NE 18-18n-2e, drilled by Stanolind Oil & Gas Company, but potential has not been taken. The Walters lease is owned by Stanolind Oil & Gas Company, Selby Oil & Gas Company and Lewis Production Company. These interests have made location for Walters 2, NW SW NE 18-18n-2e, a north offset to Walters 1. South of Walters 1, Mid-Continent Petroleum Corporation has location for Nottingham 1, NWc SE 18-18n-2e, a lease outside of the community block and owned in partnership with Carter Oil Company.

This gives the area three wells drilling outside of the community block and there is one inside the block. The field now has 21 producing wells, 20 on the community block and one outside.

Another well was started last week two locations east of production in the Southeast Braman field, Kay County, where Helmerich & Payne, Inc., and Deep Rock Oil Corporation will drill Scott 1, NEc 20-28n-1w. The field has four producing wells, all drilled in 1938 and producing from Second Wilcox sand around 3650 feet total depth. A producer from the latest test would require three offsets. The new well is three locations north of a dry hole.

A test for possible Wilcox sand production in the old Garber field, Garfield County, was started last week by Continental Oil Company, Keudiman 1, NE SW NE 2-21n-4w, the southwest side of the pool. There is limited Wilcox sand production within the Garber field but the present well is an effort to ascertain the possibility of oil accumulation similar to that existing at Billings, where 64 Wilcox sand wells were completed following discovery in 1935.

Wildcat drilling in Oklahoma is holding steady despite the fact that several discoveries of 1938 have so far failed to afford extensions.

In Oklahoma County, Ray Vincent and associates have drilled into the Wilcox sand in Burke 1, SWc SE 6-13n-11e, and shut down for orders at 3310 feet. Top of the Wilcox sand was at 3274 feet. This well had a gas showing in Misener sand between 3172 and 3178 feet and may be plugged back to test this formation.

The one wildcat in Pittsburg County, Hubacher 1, C NW SE 11-7n-15e, is below 4900 feet. The test is being drilled by Phillips Petroleum Company.

During the month Oklahoma County returned to the wildcat list and has two wells going. R. Olson Oil Company is below 3350 feet in White 1, C NE NE 30-11n-1e. Kerr Lynn & Company has completed derrick for Olmstead 1, SE NW 12-14n-3e.

Two wildcats are active in Cleveland County. Nels Burton is fishing for drill pipe in Hirsch 1, NWc NE 17-9n-2e, total depth 5312 feet. This hole was plugged back after drilling to below 7000 feet. Harper & Turner are below 7650 feet in Taylor 1, SE NE NW 23-8n-2e.

The Murray County test of Amon G. Carter, Vinsonite 1, C NE SE 34-1s-1e, is below 1200 feet and drilling.

Garvin County came into the wildcat column a week ago and Pure Oil Company has derrick completed for Derdeyn 1, NE NW SE 19-3n-1e. This company is still in Viola lime in its Carter County wildcat, Novle 1, C NE SE 35-3s-1e.

Drilling has been resumed by Phillips Petroleum Company after a fishing job in its Stephens County wildcat, Culbertson 1, NEc SE 4-1n-5w, and the hole is below 4700 feet.

In the western part of the state the Kingfisher County test of Trigg, Carr & Gutowsky, Lankard 1, NEc SE 34-17n-6w, is getting close to contract requirements as the hole is below 6700 feet.

The Kiowa County wildcat of Hagerling and Lawson, Kemray 1, SWc NW 36-5n-8w, 8 miles south of Hobart had a small gas show at 359 feet but no test was made. It is below 600 feet.

The deep Washita County test of Continental Oil Company, Proctor 1, C NW 28-10n-20w, has been underreamed to below 10,000 feet. Bottom of the hole is 10,195 feet and 9-inch casing is to be run.

OKLAHOMA Completions

Company, Well and Location	Init. Prod. Bbls.	Depth.
Caddo—		
York-Kansas Oil, Inc., Sloan 1, ne sw nw se 3-5n-9w	*	4000
Creek—		
McAdams et al, Jackson 1, swc nw 31-17n-10e	228	2715
Swift, Lamp 1, sw se sw ne 10-18n-8e	*	2900
Jackson, Wills 11, se nw nw 26-18n-8e	15	2642
Kessler, Cartright 1, nw ne ne 29-18n-9e	105	2891
Big Four, Copeland 2, sw se nw 24-19n-7e	8	2785
Vance 2, ne nec sw 24-19n-7e	12	2763
Fogle, Replogle 1, 280 ft n cwl nw ne ne 36-19n-7e	*	2661
Comail, Curren 1, sec 21-19n-6e	*	3606
Grady—		
McCasland, Horseman 1, sw ne se nw 8-3n-5w	*	2790
McCasland et al, Woods 1, sw ne se ne 17-3n-5w	45	2756
Jackson—		
Mathews et al, Abernathy 1, c sw sw nw 2-1n-20w	38	1561
Lippert, Howard 1, ne sw nw 10-3n-19w (otd 953 ft)	*	1675
Lincoln—		
Cooper, School Land 5, se ne ne 16-14n-6e	628	3090
Logan—		
Helmerich et al, Strain 1, nwc se 27-16n-1e (pb 5208 ft)	¶25.7	5400
(Correction—abnd 1-23-29)		
Gulf, Knowls 3, swc nw 34-17n-4e (pb 4950 ft)	*	6920
Muskogee—		
Heydrick, Paschall 1, ne ne se nw 22-13n-19e	*	1468
Okmulgee—		
Selby, Sutton 10, nw nw sw se 33-14n-14e	2	1212
Young, Bruner 7, 200 ft n cw½ se 5-15n-14e	10	820
Payne—		
Mid-Continent, Brandon 4, nw se ne 13-18n-1e	8699	4854
Ramsey 7, nw se nw 18-18n-2e	6796	4767
Pontotoc—		
Phillips, Morris 18, se sw sw 25-2n-6e (otd 3678 ft)	146	2846
Magnolia, Young 2, nec nw 22-2n-7e (pb 1749 ft)	37	4341
Jones et al, Scrivner 1-A, sec sw 15-2n-7e	*	1440
Getty, Masters 10, ne nw nw 23-2n-7e	56	1393
Senora, Burk "A" 1, sw se se 25-5n-4e	240	2459
Oil Roy, Morman-Flemming 1, sec 7-5n-5e (pb 2511 ft)	25	2585
Pottawatomie—		
Stephens, Sharp 1, nwc se 6-6n-5e	600	4144
Sinclair-Prairie, M-Qua-Ka 3, se sw sw 11-7n-4e	150	4190
Elbar, Hathcock 1A, sw se sw 11-7n-4e (otd 3166 ft)	135	4141
Associated, Riddle 1, sw se nw 14-7n-4e	Abnd.	Lcn.
Arkhoma, Bean 2, se sw nw 36-7n-4e (otd 4210 ft)	115	4285
Denver P&R, Villines 1, nw sw sw 36-7n-4e	152	4316
Mid-Continent, Kah-dot 3, nw se se 36-7n-4e	160	4232
Berkey, Billington 2, se sw sw 31-7n-5e	397	4220
Alma, Smith 1-A, cwl sec ne 32 7n-5e	20	3094
Helmerich et al, Roberts 1-A c ne se 3-8n-4e	216	4135
Seminole—		
Sunray, Fleet 1, ne sw sw 12-6n-5e (pb 2900 ft)	179	3909
Rogers et al, Robinson 2, nw se se 36-8n-7e	Abnd.	Lcn.
Stephens—		
Carter, Warden "D" 2-A, nw ne se nw 34-1s-5w	8	738
Pace, Gilworth "A" 5, sw se nw 2-2s-8w	*	2538

* Failures; † Junked; ¶ Million cu. ft. gas.

Kansas Field Developments

Operations still continue to reflect less activity.

One field extended; another expansion is probable.

Wichita.—With the exception of the high average potential output of producing wells, all phases of field activity in Kansas last week reflected the slower trend of drilling that has been held since last fall.

Only one field extension was completed. This moved production of the Allon field, Russell County, a half mile to the east by completion of Stearns Drilling Company and Vernon Oil & Gas Company's Olson 1, NE NW NW 27-14-14w, which made potential of 292 barrels from 3009 feet in the Lansing-Kansas City lime.

The showing of the well a mile south of production in the two-well Leesburgh pool, Stafford County, continued favorable. Oil rose 3900 feet in the hole in 45 minutes without acid treatment when Continental Oil Company drilled the plug in Russell 1, SWc NE 13-25-13w. Depth is 4041 feet. This company completed swabbing tests and is ready to take potential for the half mile eastward extension of the Morel pool, Graham County.

Well completions again ran ahead of wells started in Kansas last week. The 27 wells completed contained 17 producing wells, whose combined potential rating was 25,416 barrels.

The one extension well for the week in Kansas moved production a half mile to the east of the Allon pool, Russell County. The well was showing for production last week. Stearns Drilling Company and Vernon Oil & Gas Company's Olson 1, NE NW NW 27-14-14w, made potential of 2992 barrels from 3009 feet in the Lansing-Kansas City lime section after acid treatment.

Although the well is not officially complete, the mile southward extension for the Leesburgh pool, Stafford County, was accepted late last week. Continental Oil Company, owner of the two producing wells to the north, drilled the plug in Russell 1, SWc NE 13-25-13w, and oil rose 3900 feet in the hole in 45 minutes. Depth is 4041 feet, with casing set at 4027 feet. The well may be treated with acid to determine the possibility of flowing production.

The extension well for the Morel pool, Graham County, listed two weeks ago because of its showing is now ready to take potential. It is Continetal Oil Company's Drumm 1, SEc NE 16-9-21w, a half mile east of production. The well swabbed 60 barrels in 5 hours on preliminary test from an Arbuckle lime section between 3679 and 3702 feet.

A Barton County wildcat which had a small showing last week and is still being tested is Gulf Oil Corporation's Louis 1, C N½ NW SW 2-25-12w, northwest of Ellinwood pool. It had 20 feet of oil in the hole from Arbuckle lime between 3347 and 3367 feet, the last five feet being cored.

Further testing is under way for the Stafford County test of S. A. Murphy and Virginia Drilling Company: Schloctermeryer 1, SEc NW 7-21-11w, had a saturated core in the Arbuckle lime between 3456 and 3463 feet. There was only a small showing after the plug was drilled.

A Marion County wildcat went into the abandoned class last week when Caco Oil Company abandoned Jolliffe 1, SWc SE 22-22-5e. The test was 3 miles southeast of production in the Urschell pool. Hole was carried to 2808 feet in the Mississippi lime.

The week also established a south limit for production in Chindberg pool, McPherson County. Here Jess Cling abandoned Magnuson 1, NWc 25-19-3w.

A half mile northeast of the Hagen pool, Barton County, Champlin Refining Company has drilled to 3340 feet in Arbuckle lime in Grant 1, NW SW NW 20-20-11w, with nothing showing.

Wichita.—Kansas had 27 completions last week and 19 wells started. The completion list included 17 producing wells, combined initial output 25,416 barrels, 2 gas wells and 8 dry holes. Rice County led in locations with 4. Other counties had the following totals: Cowley, Ellis and Russell, 3 each; Barton, 2; Greenwood, Reno, Rush and Stafford, 1 each.

KANSAS
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Barton—		
Sinclair-Prairie, Pincher 1, 100 ft w ne se se 10-16s-11w	*	3245
Deiter, Putman 2, csl se ne sw 3-17s-13w	669	3378
Amerada, Kruckenburg 1, c ne ne 14-19s-15w (pb 3595 ft)	132	3622
Gulf, Nicholas 5, cwl nw se nw 12-20s-11w	*	3347
Butler—		
Higgins et al, Shrine 1, ne nw se 22-26s-4e	*	1000
Ritchie et al, Kimball 1, nw sw sw 3-27s-6e	*	2475
Cowley—		
Hartman et al, Waite 3, 80 ft e of sec nw 21-31s-4e	3765	3286
Brewer, Lewis 1, nw se ne 28-31s-4e (otd 3349 ft)	1421	3357
Wakefield, Hower "B" 1, sec 32-33s-3e	10	3332
Ellis—		
Cities Service, McCord 1, nwc ne 26-11s-17w	3500	3487
Hall "E" 1, ne swc se 35-11s-17w	104	3606
Darby, Peavey "A" 1, sec sw 13-11s-18w	2275	3411
Gulf, Karlin 1, nw ne nw 13-12s-18w	1746	3697
Harvey—		
Lanahan, Lagree 1, sec 4-23s-3w	*	280
Kingman—		
Duwe et al, Kimminau 1, ne nw sw 12-30s-9w	*	4799
Pratt—		
Skelly, Lunt "B" 1, c ne¼ 18-28s-11w	¶34.8	4278
Rice—		
Phillips, Bolton 3, sw sw nw ne 31-18s-7w	2112	3206
Continental, Wood 9, nw se se 12-18s-8w	2542	3224
Russell—		
Texon, Hall 1, nwc se 26-14s-13w	1855	2872
Crown, Krug "B" 2, nwc 26-14s-14w (pb 3028 ft)	597	3250
Western Kansas, Schneider 2, se ne nw 35-15s-14w	1950	3347
Sedgwick—		
Fuller, Kirkpatrick 1, sw se nw 24-25s-1e	*	3058
Stafford—		
Stanolind, Fuller 4, e w½ se sw 11-24s-11w	1062	3774
Martin 6, e w½ ne nw 14-24s-11w	1282	3801
Stevens—		
Stevens, Brubaker 1, e nw¼ 34-33s-37w	¶17	2777
Sumner—		
Sinclair-Prairie, Kamus 10, nwc sw 28-31s-1w	394	3694
Woodson—		
Sheedy et al, Fuhlhage 1, cwl sw ne sw 27-25s-14e (pb 1055 ft)	*	1560

* Failures; † Junked; ¶ Million cu. ft. gas.

Kansas Corporation body is restored to regular quota

Appointments made February 20 restored the Kansas Corporation Commission to its required three members. Governor Payne H. Ratner named A. F. Schoeppel, Ness City attorney, as chairman of the commission, which has supervision of proration in Kansas. The other appointment went to Arnold R. Jones, Topeka, an accountant who served the state in that capacity during the administration of Alf M. Landon.

Both are republicans, and with E. E. Blincoe, democrat, fulfill requirements of the Kansas statute. Blincoe's term expires in March, but it is possible that he will be renamed as the representative of the minority party to the commission.

Vacancies on the Kansas commission started in January when Homer Hoch, former chairman, resigned to become an associate justice of the Kansas State Supreme Court to which he was elected. In February, E. R. Sloan, commission chairman, resigned.

Schoeppel has had experience as an oil producer but no longer is engaged in the oil business. Jones was once an assistant professor of accounting at Kansas State College. At the time of his appointment he was engaged in public accounting in Topeka.

The first proration business for the new commission members will be the order for the March allowable. The indicated demand for the month is 158,429 barrels daily, 4500 barrels in excess of the demand shown when the hearing was held for fixing the February allowable.

Iowa now figures in Forest City play

Iowa, long an area of little interest to searchers for oil, now boasts a leasing activity that has embraced nearly 70,000 acres comprising 400 leases in 25 counties. Iowa has had only a nominal sort of participation in the Forest City basin lease play for the past six months. Now the basin lease play has spilled northward and since then lease men have been covering Southern Iowa with a fervor that may outdo their Missouri efforts.

Bonuses range to $1 an acre, with 25 cents the general price for rental upon renewal. Customary ⅛ royalty to landowner prevails.

Only one oil well has ever been drilled in Iowa. Located near Clarinda, it was carried to 5300 feet and abandoned, although later examination of the core records showed that three oil-bearing sands were passed by without a test.

Oklahoma City operators are prominent among lease men closing for large acreage. W. C. Peery of Oklahoma City has recorded 20 leases for 3166 acres in Page County. W. C. Kite, another Oklahoma Citian, has filed 20 leases,

8672 acres in Mills County, also three large leases in Montgomery County. Reputedly the largest Iowa lessee, S. J. Rhoades, Tulsa, has made up large blocks in Ringgold, Taylor, and Fremont counties. Charles Ullery of Tulsa has 60 leases on 9000 acres in Decatur County. R. W. Slewmaker, Tulsa, holds 6 leases on 1000 acres in Wayne County. Phillips Petroleum Company, working a staff of land men out of Creston, in Union County, is the first major to take an active interest.

No tests have been drilled, and no development plans have yet been announced. However, regulatory legislation has already been put before the state legislature and southern Iowans are eagerly awaiting the tests that will prove or condemn their land.

Illinois play may spread into Missouri and Iowa

Dorsey Hager, consulting geologist of Centralia, declared geological formations of the Forest City basin of Northern Missouri and Southern Iowa to be similar to those of the Illinois basin, indicating a development campaign may result in the Missouri-Iowa area similar to the boom currently taking place in Illinois. Speaking before a business group at St. Louis, Missouri, last week, he said Illinois' present production of 146,000 barrels daily could easily be raised to 400,000 or 500,000 barrels daily in a few years time.

"The Lake Centralia oil field opened last year is today one of the major oil fields in the country, and Beecher City will in time produce as much oil as the Lake Centralia field," he said.

Cathodic installation

Sun Oil Company is to install a cathodic protection unit on its pipe lines in the A. B. Hardin survey, Hardin area, Liberty County, Texas.

Illinois Developments

Get second largest gas well in Russell Township. Devonian lime production indicated in Tamalco.

Olney, Ill.—The second-largest gas well in the Russell Township gas field of Lawrence County was furnished last week by Kesl & Olin's Scott Gray 3, 7-4n-10w, which started at 23,000,000 cubic feet. It topped the Buchanan sand at 1086 feet and was completed at 1115 feet.

One location east of a 2,500,000 cubic feet producer which had been believed to indicate the edge of the pool, the heavy production was unexpected and will encourage additional eastward development of the new pool. Combined initial production of the pool is 240,000,000 cubic feet, with a recently completed 30,000,000 cubic foot well of the Kentucky Natural Gas Company holding the production record.

Devonian lime production in Bond County was indicated by Southwest Oil Company's D. E. Butler, NE SW 31-4n-2w, 12 miles south of Greenville in an old shallow Tamalco Township pool. The test topped the formation at 2452 feet and drilled two feet of saturation. With some water in the hole, successful completion was in doubt. The oil was described as being of high gravity.

In Wabash County, extreme southeastern Illinois, R. S. Hayes' Anna Schultz 1, SE NW SW 7-3s-13w, Compton Township, was abandoned at 1500 feet when quicksand and gravel clogged the hole. The rig was moved for a second try.

While the Wabash river was down several feet from its flood stage, ground conditions still prevented activity at Longhorn Oil Company's Mrs. J. M. Helm 1, SW SW NW 15-3s-14w, Compton Township, Wabash County. The wildcat is 4 miles west of the Cooper pool opener across the river in Gibson County, Indiana. A gradual improvement in ground conditions indicated the well could be continued toward the McClosky late in the week.

In Washington County, Adams Oil & Gas Company's (Taylor Drilling Company, Hutchins) Weihe 1, NE SE NW 35-2s-3w, Nashville Township, 2 miles south of Nashville, was abandoned at 1620 feet. The Benoist, topped at 1380 feet, was dry. The wildcat was influenced by G. H. Blankenship's J. L. Dennis 1, pool opener in Pilot Knob Township. Southwest of that discovery 1¼ miles, G. H. Blankenship and Pres Cochrane's Oak Grove Cemetery 1, SE SE SW 15-3s-3w, was drilling at 700 feet. Its successful completion would force offsets by Shell Petroleum Corporation and Magnolia Petroleum Company.

In Wayne County, Thompson Drilling Company and Sanders' Briscoe 1, SW SW NW 21-2n-7e, Bedford Township, passed through Stein, Benoist, Rosiclaire and McClosky saturations but a picture showed none were sufficient to make a well. The wildcat was plugged at 3190 feet.

After drilling to a dry McClosky lime and spending several weeks trying to shut off water in the Cypress, Gulf Refining Company abandoned Palmer 1, wildcat in NW NW SW 35-4n-7e, Hoosier Township, near Sailor Springs, Clay County. It had been drilled to 3140 feet before plugging back.

Another wildcat failure was Harry Hazlett's Wetzel 1, SW SW SE 12-5n-6w, Alhambra Township, Madison County, where water entered the hole after a shot. A show of oil was had at 1890 feet. Hazlett plans another test within a half-mile of Wetzel 1 for this spring.

In Richland County, J. A. Wolf and associates have purchased the Wattleworth lease in Sections 25 and 35-4n-10e, comprising 200 acres. The lease, bordering the developed section of the North Olney Township pool on the east, had been held at a high figure and for a time halted development in that direction. Several excellent wells have been completed just west of the lease. Location for a McClosky well, with a contract depth of 3100 feet, has been made on the center of the lease. It will be Wolf & Andrews' Wattleworth 1.

Leathers et al's A. Yonaka 1, NW SE SW 22-2n-14w, Bonpas Township, southern Richland County's first wildcat, took a core from 2750 to 2756 feet, in the shale just below the Weiler sand, which had a strong odor of oil. The test was continuing on toward the McClosky.

Sole active White County operation last week was Ed Robinson's C. Spring-

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er 1, wildcat in the NE SW NW 18-4s-8e, Mill Shoals Township, drilling at 1100 feet.

Bert Fields et al's Green 1, SW SW SW 16-9s-9e, Gold Hill Township, Gallatin County, was drilling at 2600 feet, expecting the McClosky in another 100 feet. Since passing through a Waltersburg sand saturation between 1767 and 1803 feet, the wildcat has been responsible for one of the widest leasing and royalty buying campaigns in the basin. Royalty a mile from the test was reported selling for $160 last week.

G. H. Blankenship's Rheinecker 1, NW NW NE 3-6s-4w, Cutler Township, Perry County wildcat, was drilling at 440 feet last week.

ILLINOIS

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Clay County—		
Pure, Arthur Routt 1A	570	3075
Routt Consolidated 2	404	3083
F. Holman 2A	289	3100
F. J. Seawright, Chas. Wilson 1	*	2489
Clinton County—		
Iroquois Oil & Gas Co., Parrish 1	*	1402
Adams O&G Co., Hoffman Heirs 1	*	1437
Keister 3B	18	1226
Coles County—		
Texas Co., W. H. Tracy 1	*	3222
Effingham County—		
Baker Dr. Co., Koester 1	*	42
Fayette County—		
Carter, James Feezel 2	396	1571
James Feezel 3	192	1575
Phyllis Reece 4	380	1579
Matson Reed 3	540	1465
Henry Cline 2	230	1532
Sydney Rickett 1	382	1502
Sydney Rickett 2	1080	1503
Joe Tipsward 1	996	1521
Flossie Wellman 1	300	1516
Flossie Wellman 2	504	1497
Nora Workman 2	210	1523
T. Wright 2	300	1495
Jacob Rhodes 1	396	1487
A. Fortner 1	151	1520
R. T. Hopper 2	130	1591
R. T. Hopper 3	144	1554
H. O. Lewis 2	157	1593
Kay Birdie 1	870	1487
Kay Birdie 2	110	1472
Kay Birdie 3	932	1518
Lizzie Smith 2	796	1586
Oscar McClain 2	396	1566
Oscar McClain 3	212	1570
S. M. Dial 2	117	1591
Mabee Dr. Co., Homan 3	300	1591
Homan 4	140	1590
Shell, Milliser 1	75	1575
Milliser 2	136	1575
Whisenant et al, C. E. Smith 5	158	1563
Smith 6	75	1608
Jarvis Bros., Homan 4A	250	1561
Texas Co., Philbrook 3	100	1553
Philbrook 4	102	1555
W. C. McBride, Inc., Stokes 6A	275	1464
Roy Fisher et al, Rhodes 1	90	1592
Merrick & Apperson, Batterbusch 4	170	1522
Jefferson County—		
Carter, Arnold Crane 1	226	1957
O. K. Miller 1	148	1940
Lundy & Winkler, Martin 1	*	.....
Marion County—		
F. W. Firman, Suggs 1	*	2150
Magnolia, J. H. Young 25	168	1844
J. H. Young 26	125	1855
J. H. Young 27	96	1830
Texas Co., W. Frederick 8	450	1777
A. McCollum 8	300	1775
R. Shanafelt 3	100	1770
R. Shanafelt 4	100	1782
T. Stroup 2	310	2051
J. Friesner 3	900	1731
J. Friesner 4	354	1770
E. Hayes 1	342	1710
Hopkins 3	142	1697
S. McCoy 2	200	1823
S. Parker 3	200	1900
S. Parker 4	263	1898
Baldwin Oil Co., Holms 2	738	2060
Randolph County—		
Badger O&G Co., Schrader 1	*	2300
Richland County—		
Pyramid Pet. Co., Houser 1	250	3024
St. Clair County—		
O'Meara et al, Tarlton 1	150	539
Tazewell County—		
Hopedale O&G Co., Litwiller 1	*	2310
Wayne County—		
Pure, Keith 1	213	3136
H. H. Weinert, Muhlbach 1	184	3300
Dr. Moore, Moore 1	*	3402

*Failures; †Junked; ¶Million cu. ft. gas.

Kentucky Fields

Henderson County gets another McClosky sand pool.

Outpost performance indicates Gilmore extension.

Owensboro, Ky.—Sun Oil Company and Kentucky Natural Gas Company's G. Trigg 2 started flowing natural last week at the rate of 8 barrels an hour when plugs were drilled to the McClosky, opening a new Henderson County oil pool 12 miles from production. In the Corydon Section, 8 miles southwest of Henderson and 2 miles north of Corydon, the wildcat had recovered a good 2-foot core from the top of the lime a week ago at 2605 feet.

Production soon filled the 100-barrel tank. The test was shut down to await additional tankage. The stripe was anticipated in view of a good McClosky saturation found last year at the Trigg 1, a mile to the east. The first well, however, was drilled too far into the lime and was drowned out by salt water. The structure at the new test was encountered 16 feet higher than at the Trigg 1. Twelve miles northeast, 100 shallow wells are on the pump in the Niagara pool.

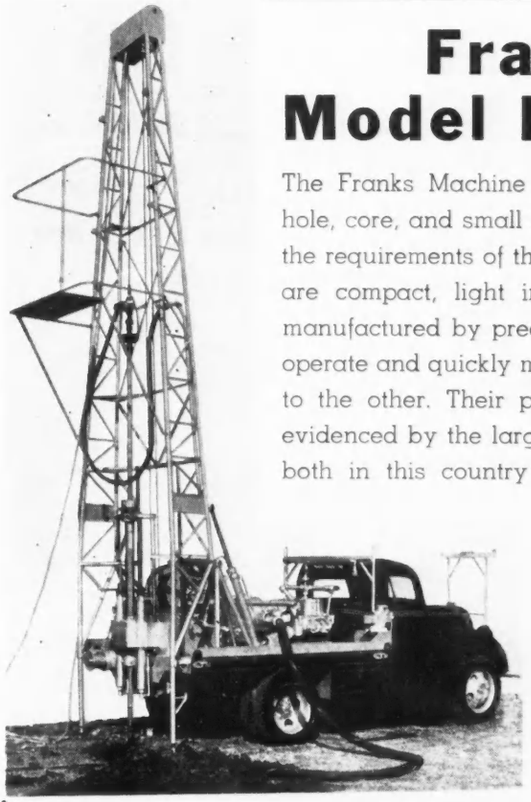
In eastern Henderson County, Sun Oil Company and Kentucky Natural Gas Company's E. Allgood 1, east of production in the Gilmore pool, swabbed and flowed 95 barrels of oil in a short period following extraction of

KENTUCKY

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Daviess County—		
Smith et al, B. Bristow 5	*	1650
Major Oil Co., Federal Land Bank 1	200	1904
Ohio, O. Lively 1	200	1900
Hunt et al, Howard 2	*	588
Floyd County—		
Warfield Nat. Gas Co., Wells et al 4820	¶.43	3030
Columbia Fuel Co., C. & C. Co. 827	¶.08	2953
Henderson County—		
J. C. Ellis, K. A. Jones 2	40	1947
Martin County—		
Warfield Nat. Gas Co., Webb 4778	¶.35	2753
Ohio County—		
Snyder et al, Westerfield 3	*	601
Nollen O&G Co., Crow 13	*	551
Pike County—		
Columbia Fuel Co., John Smith 830	¶1.30	1740
Tierney 831	¶.50	1729

*Failures; †Junked; ¶Million cu. ft. gas.



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acid and was being prepared for a 24-hour test. An eight-foot McClosky core had been recovered before casing was set, and the spudder carried the hole deeper in that formation. It is the seventh, and promises to be the largest producer in the Gilmore pool.

In the Spottsville section, Magnolia Petroleum Company's J. E. Casey 1, a Devonian test, was drilling below 3730 feet with standard cable tools.

In Hopkins County, Gulf Refining Company's Schmetzer (Simon Clements) 1, south of Madisonville, was attracting attention as it entered the Devonian. A gas show was encountered at 4311 feet and coring was in progress at 4320 feet at last report.

Fred Phillips' Shearin Coal Co. 2, a southeast diagonal offset to this operator's discovery, Shearin 1 in Muhlenberg County, northwestern Kentucky, was spudded last week. A third well will be drilled on this lease when the No. 2 has been completed. The discovery, completed early this month, flowed 280 barrels in its first 24-hour gage test.

Many operations in Western Kentucky continued under water last week, with indications that several days and possibly weeks will pass before development activity is resumed at a normal pace.

Meanwhile, however, Henderson County is looking toward "oil money" to pay its share of a $25,000 remodeling job on its court house. N. Powell Taylor, Henderson attorney representing the local bar association, at a meeting called to discuss the project last week, declared that increased revenue from oil will meet the obligation.

Indiana Fields

Core in discovery offset confirms Cooper strike

Evansville, Ind.—Confirmation of the Cooper pool of Gibson County was indicated last week when Hollingsworth & Bander Drilling Company's David M. Cooper Estate 1, NE 13-3s-14w, Wabash Township, 240 feet south of the discovery, encountered an excellent 20-foot McClosky core between 2855 and 2875 feet. Casing was set to the top of the formation, and the well was to be drilled out late in the week.

After being shut down in the Jett sand at 1250 feet for several weeks, C. D. Neff's Ollie Deeg 1, wildcat in the NE NE NW 32-7s-7w, Luce Township, Spencer County, was taken over last week by Leggett Drilling Company. The test topped the McClosky at 1688 feet and was preparing to core from 1690 feet. Location is 2 miles south of Hatfield.

Chas. C. Taliaferro's Jos. F. & Maggie Hopf 1, SE NW NE 12-2s-5w, Bainbridge Township, Dubois County, like many other Indiana tests, was delayed by bad weather last week. It was at 650 feet.

In the Heusler Dome area of Posey County, Sun Oil Company was moving equipment from its abandoned E. J. Schroeder 2 to the adjoining Clem Hahn farm for a well in the SE NW SW 1-7s-12w, Marrs Township.

Midwest Development Corporation's Perry F. Jackson 1, NW NE Donation 54-3n-9w, Palmyra Township, Knox County, was shut down at 3057 feet, as was the nearby Parshall-Graham Oil Company's Maude J. Simpson 1, SW NW NW 23-1n-10w, Johnson Township, drilled to 3510 feet. The latter test has been plugged back to 3399 feet.

With derrick up and pits dug, A. Grewe & August Kruse's P. Scherer 1, NW NW SW 13-7s-13w, Black Township, Posey County, was awaiting recession of the Ohio River overflow before moving in machinery. The lease calls for drilling to start by Feb. 28.

INDIANA
Completions

Company, Well and Location		Init. Prod. Bbls.	Depth
Madison County—			
Ryan & Jones, Walker 1	*	1102	
Pike County—			
Shelby, Craig Heirs 4	¶	326	
Shelby County—			
Kaylor, Kaylor 1	¶	810	
Sullivan County—			
C. C. Davis, Huff 2	¶	759	
W. F. Sovers 1, T. B. Dix 1	*	875	

* Failures; † Junked; ¶ Million cu. ft. gas.

Report reviews success of Bradford water flooding

Northwestern Pennsylvania's Bradford oil field, where production had almost ceased a comparatively few years ago, now is responsible for approximately 85 percent of the state's entire production, according to F. A. Pitkin, executive director of the Pennsylvania State Planning Board.

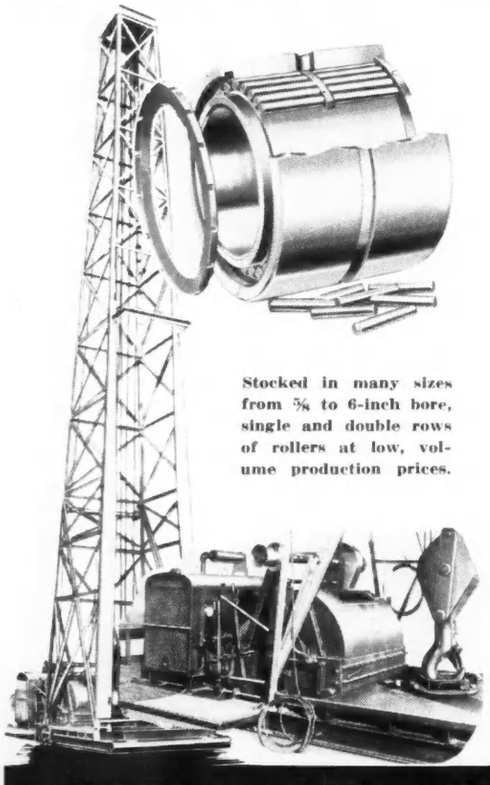
"This recovery was achieved by the unusually successful application of artificial water flooding methods, for nowhere else in the world has water flooding been so successful," Pitkin said in a report issued last week. "Previously the oil had been produced by ordinary drilling and pumping methods which utilized the natural pressure of the reservoirs themselves. With the ultimate exhaustion of this natural pressure, however, those methods became ineffective.

"The Bradford field, 86 percent of which is located in the north central part of McKean County, Pennsylvania, and 14 percent in Cattaraugus County, New York, is the nation's second largest field in total of continuous production area. While the Bradford field occupies but 5 percent of Pennsylvania's

PENNSYLVANIA
Completions

Company, Well and Location		Init. Prod. Bbls.	Depth
Bradford District			
Corwin & Gallagher, Corwin		1	....
Oil City Trust Co., No. 152, fee		5	....
N. V. V. Franchot, Mgr. Trustee, Warters		½	....
Forest Oil Corp.		1	....
Niagara Oil Corp.		1	....
Bradford Transit Co., 7 wells		7	....
Bradford: Water Intake Well			
Niagara Oil Corp.		...	....
Butler-Armstrong District			
Lione, et al, J. Lione	*		....
Middle District			
S. H. Elder & Co., Hamlin		1	....
New York-Pennsylvania: Gas Field			
Belmont Quadrangle Drilling Co. Wolcott	¶		....

* Failures; † Junked; ¶ Million cu. ft. gas.



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petroleum area, it is exceeded in total of continuous production area only by the comparatively new East Texas field.

"From its beginnings in 1871 (as early as 1862 oil was known to exist in the vicinity but no development was undertaken), the Bradford field has produced to the present time almost 400,000,000 barrels of oil. In total production, it ranks among the first 10 fields in the nation. Of this total, 203,600,000 barrels were produced by ordinary methods utilizing natural pressure, while an additional 175,000,000 barrels have been recovered by water flooding.

"As the Bradford field is estimated to have had an original supply of 1,250,000,000 barrels, experts believe that by using present methods of production, the eventual total can be raised to approximately 500,000,000 barrels. During the past three years, these methods have produced an average annual total of 15,000,000 barrels.

"According to these estimates, however, 60 percent of the total oil originally present in the Bradford field will still remain underground after the present system of water flooding ceases to be effective," the report added. "Thus, if our state's largest producing field is to retain any measure of the present pre-eminence beyond the next dozen or so years, new methods will have to be discovered for the recovery of this large portion of our oil resources. When it is considered no other oil in the world can even approach Pennsylvania oil in point of quality for lubricating purposes, and that a great reduction in the field's present production rate would throw thousands out of employment, the problem becomes a major challenge to Pennsylvania's inventive genius."

Osage lease sale

Sales of Osage tribal leases by auction is scheduled for March 22 at Pawhuska, when 12,500 acres will be up for bidding. The tribal council last week petitioned the superintendent to set the sale for that date. Meanwhile oil producers will have the privilege of asking that desired tracts be included.

OHIO

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Guernsey County—		
Jones & Jewell, Reed 1	*	1250
Ohio F. G. Co., Boston 1	¶15	1502
Knox County—		
C. O. Moore, Robinson 1	*	671
Lawrence County—		
Meigs Dev. Co., Culbertson 1	*	3000
Licking County—		
C. A. Davis, Clemings 1	¶50	2539
Geo. Vandergrift, Hughes 2	10	799
Logan County—		
Lake Gas Co., McCollough 1	¶	1383
Medina County—		
Dempsey, Rhodes 1	¶40	3519
Meigs County—		
Wright et al, Nelson 1	¶10	471
Ohio F. G. Co., Archer 3	¶13	1031
Peoples et al, Musser 1	¶60	811
Noble County—		
Yokes Valley Oil & Gas Co., Ward 1	¶1.00	1417
Washington County—		
Ohio F. G. Co., Knoch 7	¶14	1839
Koon Run Oil Co., Hendershot 3	¶	1293
Schramm et al, Felter 2	¶10	1872

*Failures; †Junked; ¶Million cu. ft. gas.

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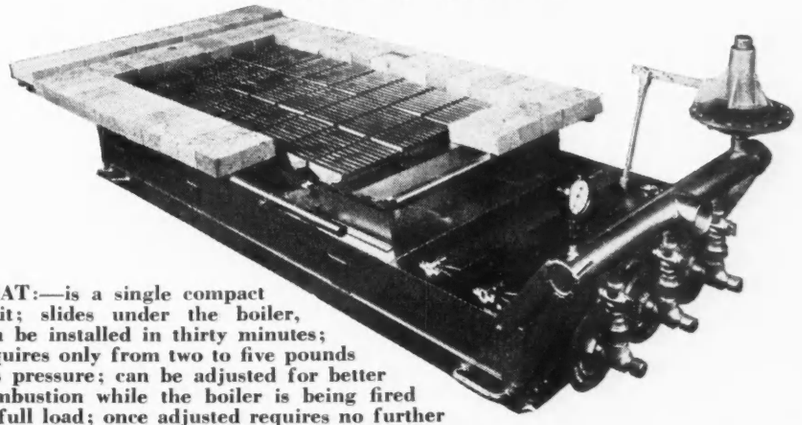

THAT:—is a single compact unit; slides under the boiler, can be installed in thirty minutes; requires only from two to five pounds gas pressure; can be adjusted for better combustion while the boiler is being fired at full load; once adjusted requires no further attention; will develop the highest possible overloads with absolutely no damage to the boiler because the heat is applied to the crown sheet and flues instead of the sidewalls and mudring, thereby eliminating a lot of boiler trouble, as well as giving higher efficiency.

SEE PAGE 2065 COMPOSITE CATALOG OIL FIELD EQUIPMENT

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VOIR MATERIEL DE CHAMPS PETROLIERS DANS CATALOGUE COMBINAISON PAGE 2065

ESTE—es un grupo unitario compacto; se desliza debajo de la caldera; se puede instalar en 30 minutos; no exige mas de 2 a 5 libras de presion de gas; puede regularse para una mejor combustion mientras la caldera esta bajo presion maxima; una vez regulado, no requiere mas atencion; desarrollara las sobrecargas mas grandes posibles sin ningun peligro para la caldera, pues el calor queda aplicado a la lamina superior y conductos, en lugar de las paredes laterales y camara del lodo, evitandose asi muchas irregularidades e inconvenientes de caldera y asegurandose, al mismo tiempo, un rendimiento mas alto.

VEA NEUSTRA SECCION EN EL CATALOGO DE COMBINACION PAGINA 2065

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West Texas Fields

Church & Fields extension well flows 819 barrels. North Cowden east outpost fills 1500 feet with oil.

San Angelo, Texas.—The development of attractive production in the northwest extension sector of the Church & Fields area, Crane County, gained encouragement when Magnolia Petroleum Company's University 2-6, NW NE NE Section 6, Block 30, flowed 819 barrels initial. The gauge followed 560-quart nitro shot in broken lime at 3170-3285 feet. It is the largest of the 7 oil completions made since the above company aroused interest in the sand dune territory last May by making a small pumper from an exploratory test situated 3½ miles northwest of the older field. Rig has been skidded one location east to drill University 3-6.

Currently the extension area has 8 operations, including a small well in process of completion. Explorations have been scattered over a broad area, and only one failure has been recorded. This development stimulated interest in the north end of Church & Fields proper, and resulted in Gulf Oil Corporation and Humble Oil & Refining Company completing wells. Tide Water Associated Oil Company and Atlantic Refining Company's University 1-SG, offsetting the above two wells, flowed 257 barrels of oil initially through casing after 500-quart nitro shot at 3010-3125 feet. T. B. Knox et al's University-Phillips Petroleum Company 1, north offset to the latter, is rigging up.

Magnolia Petroleum Company's University 1-18, NW SW SE Section 18, Block 30, western outpost for the sand dunes sector, is credited with having logged top of lime at 2948 feet, and was drilling plugs from casing at 3047 feet. It is structurally high.

Extension Indicated

Texas Pacific Coal & Oil Company's Holt 1, half mile east outpost for the north portion of the North Cowden field, Ector County, filled 1500 feet with oil in drilling through the saturated lime section to 4476 feet. Tankage is being erected to make a swabbing test before shooting broken pay below 4250 feet with nitro.

Sinclair-Prairie Oil Company's Holt 1, prospective northwest extension for the field, will re-cement 7-inch pipe at 3998 feet before deepening with cable tools from 4100 feet. Atlantic Refining Company et al's Cowden 1-B, semi-wildcat in Andrews County and on a strike between the North Cowden and Emma fields, was swabbing down at a plugged back depth of 4280 feet. Production test at 4310 feet yielded sulphur water with small amount of free oil from upper saturation.

Sub-Leasing Active

Sub-leasing of proved and unexplored acreage is attaining important proportions in West Texas. The Texas Company has been the most active in disposing of leases that require immediate development, and considerable activity is now scheduled for its farmouts to independents in Yoakum County and the McCamey district, centering upon Crane and Upton counties. Four tests were authorized the past week on leases that the company farmed out to the Aloco Oil Company in the Wasson field, Yoakum County, H. G. Nelson et al are scheduled to start work shortly on the east 320 acres of Section 9, and the north 320 acres of Section 11, excepting 10 acres around a pumper, both in Block 3½, CCSD& RGNG Survey, McCamey field, Upton County. The Texas Company farmed out the acreage, retaining ⅛ over-riding royalty and mineral rights below 2500 feet. Pure Oil Company assigned to Cooper and Clark its Shannon 40-acre lease, World-Powell pool, Crockett County, retaining 1/16 over-riding royalty and mineral rights below 3000 feet. The latter have rigged up to drill Shannon 1, NW SE SE E. L. Section 42, Block BB. In Pecos County, Humble Oil & Refining Company assigned shallow rights on S½ H&GN Section 72, Block 10, to Leidecker et al, who are obligated to drill a 2000-foot test.

Dean Extended

A major extension to the Dean pool, Cochran County, was attained by T. H. Shaw et al's Dean 1, Labor 7, League 94, Mills County School Lands, after using acid in broken pay at 4907-82 feet. The well fills 2400 feet with oil and the column of fluid could not be exhausted on an extended swabbing test. More acid will be used to try for flowing production. It is on acreage farmed out by The Texas Company last fall.

A quarter-mile east extension for the Wasson field, Yoakum County, is indicated for Sinclair Prairie Oil Company's Kendrick 1, SW NW SE Section 825, which filled 2500 feet with oil in drilling the upper pay section at 5001-5045 feet. This outpost registered a low structural position. Magnolia Petroleum Company has started operations on Kendrick 1, half mile to the north, after holding off for several weeks to be certain of a pipe line outlet.

Partial relief for the congested pipe line situation will be available within a few weeks as Aloco Oil Company is erecting a 55,000-barrel tank on its Reilly field station site to accommodate controlled production until the completion of its 26-mile 6-inch line to Hobbs. The company began work early last week on this project and also about 20 miles of gathering lines in the Wasson area.

Texas Pacific Coal & Oil Company's Brownfield 1, northeast outpost for the Wasson field, was checking about level with nearest production in drilling at 4600 feet.

Shell Petroleum Corporation's Waples Platter Company 1, situated 3 miles northeast of the Bennet field, was drilling at 4315 feet. It is credited with being 105 feet lower than the discovery on the anhydrite marker.

WEST TEXAS Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Andrews County (Means)—		
Humble, R. M. Means 18	2707	4540
Coke County (Wildcat)—		
Barnett Pet. Corp., J. R. Mims 1	*	1861
Concho County (Wildcat)—		
Hennings et al, A. E. Jones 1	*	2025
Crane County (Church-Fields)—		
Magnolia, University 2-6	819	3285
Crane County (McCamey)—		
Texas Co., R. King 43	321	2400
Ector County (Foster)—		
Atlantic, Johnson 6-A	333	4245
Landreth Prod. Corp., Johnson 4-B	1012	4184
Stanolind, Witcher 9	470	4205
Witcher 10	1382	4176
Sunray Oil Co.-York-Harper, Inc., Witcher 1-B	754	4238
Ector County (Goldsmith)—		
American Maracaibo Co., Scharbauer 1-C	629	4185
Landreth Prod. Corp., Scharbauer 3-J	386	4210
Mabee et al, Slator-Shell 1	*	4305
Ector County (Jordan)—		
Kewanee Oil Co., University 1-A	2339	3653
University 2-A	853	3650
Fisher County (Wildcat)—		
Browning & Baker, O. R. Burnham 1	*	3220
Gaines County (Wasson)—		
Continental, Wasson 2-51	1512	4996
Blackstock Oil Co., Wasson 2	2273	5000
Howard County—		
Wallace et al, Bell 4	258	2850
Irion County (Wildcat)—		
Moore Explo. Co., Inc., Tippett-Conoco 1	*	1208
Ellis et al, Sol Mayer 1	†	265
Jones County—		
Bert Fields & Carey King, Taylor 2	4800	3243
Iron Mt. Oil Co.-Humble, Taylor 3	1600	3234
Ungren-Frazier et al, Culwell 2	2952	3250
Jones County (Wildcat)—		
J. H. Sprouls et al, J. Nichols 1	15	1796
Pecos County (Payton)—		
British-American O. P. Co., Payton 21	189	2095
Sun and Atlantic, Payton 9	135	2021
Pecos County (Pecos Valley)—		
Kone Prod. Co., Pecos Valley 8	19	1637
Peerless O&G Co., Pecos Valley 7-A	361	1585
Pecos County (Taylor-Link)—		
Eastham et al, University-Standard 2	446	1620
Scurry County (Wildcat)—		
Forest Dev. Corp., J. J. Koonsman 1	*	5004
Taylor County (Wildcat)—		
Forest Dev. Corp.-Carl King Anderson 1	*	3546
Ward County—		
Gulf, O'Brien 104	243	2781
Luse & Ice, Blair 6	402	2073
J. O. Brictson 5	343	2099
Texoil Producing, Inc., Allen 6	232	2096
Winkler County (Henderson)—		
W. K. Royalty Co., Walton-Humble 4-C	977	3055
Winkler County (Keystone)—		
Sharpe et al, Walton-Empire 2	247	3372
Yoakum County (Bennett)—		
Honolulu Oil Corp.-Cascade, Willard 1	2740	5225
Mabee et al, Willard 4	3137	5230
Yoakum County (Wasson)—		
Danvers et al, Lynn-Shell 4	627	5125
T. P. Coal & Oil Co., Hall 3	2168	5150

* Failures; † Junked; ¶ Million cu. ft. gas.

TEXAS PANHANDLE Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Gray County—		
Kewanee Oil Co., McKinney 11	326	3250
S. & S. Oil Co., Benton 2	446	3295
Hutchinson County—		
Mid-States Oil Corp., Whittenburg 24-A	760	2975

* Failures; † Junked; ¶ Million cu. ft. gas.

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North Texas Fields

Clay County wildcat fills with oil from Strawn.

Deal provides for development of Nocona by Sunray.

Wichita Falls.—West central Clay County gave promise of an oil strike in the lower Strawn the past week when L. T. Burns et al's Browning 1 filled 1000 feet with oil after using formation tester in saturated zone at 4440-61 feet. Seven-inch pipe was cemented at 4433 feet for a production test, which may be delayed several weeks while the owners are checking titles to their large drilling block. Browning 1 is located 330 feet out of the southeast corner of Block 94, J. H. Belcher Sub-division, about 7 miles south by east of Halsell. Nominal shows were logged at 3320-50 feet and 3613-16 feet. Top of the K-M-A, or Strawn lime was called at 3645 feet. This wildcat is 2½ miles southwest of Healdton Oil & Gas Company's McKee-Wallace 1, which was abandoned last May at 5886 feet, and is credited with being 200 feet higher structurally than the failure. Shell Petroleum Corporation holds protection acreage within the drilling block.

Nine Discoveries

Discoveries in North Texas this year are more numerous than those reported for the same period last year. The district has 8 deep and shallow oil strikes and a gas discovery. The three most important are from the Strawn in Archer and Montague counties. Recent shallow additions includes P. C. Burns et al's Andrews 1, Block 1, G. C. Frarley Survey, 3½ miles south of Anarene. Archer County, rated as a 102-barrel pumper at 921-25 feet. In northwestern Young County, C. W. Clark et al's H. M. Goss 1, near NWc Section 1592, pumped 4 barrels initial from sand at 1200-07 feet. K. R. March et al's Hunt-McClatchy 1, Section 79, another prospect for the latter county, tested small show oil with water at 1131-34 feet, and is to deepen to try for a lower sand.

Bridwell Oil Company's Oil Investment-Gulf 31-B, Archer County deep project in shallow area, centering 3½ miles west of the Chalk Hill lime field, tested salt water with trace of oil in upper Strawn saturation at 3806-17 feet, and was drilling lime at 4175 feet.

Buys Properties

Two property deals made early last week by the Sunray Oil Company, Tulsa, in the Nocona deep oil area, Montague County, will be followed by the company taking the initiative in the development of this promising lower Strawn pool. The company purchased Rogers & Rogers' J. A. E. Burnett 1, discovery well, and 60-acre site for a reported consideration of $75,000 in cash and notes, and $45,000 additional to be paid from oil production.

One-half interest and operating control in 472½ acres, embracing 6 leases scattered around the discovery site, was acquired by the Tulsa concern from the Ramsey Petroleum Corporation. This deal involved an unannounced cash sum, oil payments and development obligations.

The Nocona pool discovery, which was originally drilled to 4200 feet by R. L. Foree, L. S. Youngblood et al, was brought in by Rogers and Rogers last January 4 as a natural flowing well from sandy-lime at 4645-56 feet. Due to the absence of a market, the well has been produced only for short intervals. Performance test made prior to the sale credited the well with flowing 523½ barrels of 43-gravity oil in 24 hours through ½-inch tubing choke, with 600 pounds casing pressure and 70 pounds working pressure on the tubing.

The drilling of two required offsets to the Nocona discovery has been delayed to await a well spacing ruling by the commission. Stanolind Oil & Gas Company will drill a west offset, and Rogers & Rogers have an early obligation to drill a north offset in acquiring The Texas Company's 150-acre on a sliding scale over-riding royalty basis.

F-H-E Oil Company's Graham 1, southeast offset to production in the Collinsville pool, Grayson County, yielded salt water on swabbing test through casing from broken sandy-lime at 3872-3905 feet. The test will be deepened.

NORTH TEXAS Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Archer County—		
Continental, DeMoss 3	143	981
Fadadau et al, Thuman-Conoco 1, blk 67	*	1552
Horwitz & McDaniel, Benson 9, sec 1808	75	934
King & McCurdy, D. D. Strange 1, sec 32	*	1170
Shappell Oil Co., Bell 15, sec 27	137	989
Archer County (Wildcats)—		
Burns et al, Andrews 1, blk 1	102	925
Clay County—		
LeFevre & Blakely, Joint Stock Land Bank 1, blk 13	*	1465
Metzner et al, Taylor 3, sec 35	*	530
Metzner & Burns, Taylor 14, sec 23	175	1112
Clay County (Wildcat)—		
Montgomery et al, Woodward 1, sec 17	*	1690
Cooke County (Best)—		
Sinclair Prairie, Best 3	1488	4958
Cooke County—		
Schermerhorn Oil Co., Kessler 20, blk 5	15	1346
Denton County—		
Paramount Oil Co., Forrester 3	*	2089
Haskell County (Wildcat)—		
Sawyer Drl. Co., Rowland 1, sec 5	*	5120
Jack County—		
Thornton et al, Bloodworth 8	*	349
Montague County—		
Seitz-Comegys & Seitz, King 8	188	2138
Throckmorton County (Wildcat)—		
Beacon O&G Co., Hawes 1, sec 979	*	4515
Wichita County (K-M-A)—		
E. C. Oil Co., Miller 4	512	3897
Fain-McGaha Oil Corp., Griffin 6-B, blk 2	1400	3835
King Oil Co., Wigley 5-A	528	3870
Moran Bros., Inc., Waggoner Bros. 2-D	800	3874
Omohundro et al, Pace 3-B	744	3814
Sunray Oil Co., Denny 2	608	3887
Wichita County—		
Shell and Phillips, Reilly 2	*	1859
M. Staniforth & Co., E. Reilly 1	8	760
Wilbarger County—		
Maxwell & Bazoon, C. Zipperle 1	*	973
Wilbarger County (Wildcat)—		
Humble, Baker 1, sec 31	*	2993
Young County—		
Barrett & Reynolds, Burgess 1	*	2142
Brazelton Bros., McBrayer 4, sec 1907	*	693
Brazos-Young Corp., Sloan 1	*	4802
Dean Bros. et al, Cox 1, blk 18	*	600
Cox 2, blk 18	*	610
Pet. Producers Co., Boone 15, sec 1, (key well)	*	532
Young County (Wildcat)—		
Clark et al, Goss 1, sec 1592	4	1207

* Failures; † Junked; ¶ Million cu. ft. gas.

Jones County wildcat logs saturation at 2651 feet

Abilene, Texas.—An oil strike for west central Jones County was in prospect the past week after Ralph Carrol et al's Herndon 1, Block 3, Goliad County School Land Survey No. 359, logged oil saturated lime at 2651-55 feet, followed by lime and shale to 2677 feet. Pipe will be run for a production test. It is in a sparsely drilled area, and 5 miles southwest of the Chittenden pool.

The twelfth producer for Griffin pool, centering on the east side of Avoca townsite, proved to be one of the largest. Bert Field et al's Taylor 2, offsetting production, flowed 209 barrels per hour natural from Palo Pinto lime at 3228-43 feet. Extensions to the northeast and south are pending.

Forest Development Corporation's Boyd 1, Stonewall County wildcat, is installing cable tools to make a production test in oil saturation logged at 4690-4708 feet. An attempted drill-stem test failed because of cavings. Top of the Noodle Creek lime was logged at 2730 feet, and Palo Pinto lime at 4687 feet. The prospect is located 5 miles north and the same distance east of Aspermont.

New starts in Texas total 123 for week

Permits for drilling 123 new wells in Texas were approved by the railroad commission last week, 167 less than were allowed the previous week.

No permits were approved for drilling in the East Texas field, although seven locations were reported from the remainder of the East Central Texas area.

There were 21 locations allowed in West Texas, including 10 in Ector County. Operators in West Central Texas listed 19 locations. The Gulf Coast area held first place with 30 permits approved, while Southwest Texas producers were allowed 17 locations.

Reports from North Texas showed approval of 29 locations in that area. No permits were granted in the Panhandle district.

Appalachian meter school proceedings published

The Proceedings on the First Annual Appalachian Gas Measurement Short Course have been printed in book form and are now ready for distribution. The school, the first of its kind in the eastern United States and the third in the country at large, was held August 22, 23 and 24, 1938, at the University of West Virginia. It was jointly sponsored

by the University and the Public Service Commission of West Virginia, with H. J. Wagner of the Commission serving as chairman of the Meter School Committee.

Over 300 representatives from the utilities, manufacturers and gas producers in 12 states attended. The success of the first school was gratifying to the sponsors, who have announced dates of August 21, 22 and 23 for this year's meeting.

The Proceedings of the 1938 meeting cover papers read and discussed on the general theme "Theory and Practice of the Measurement of Gases." All those who registered at the school have been given copies of this bulletin. It is felt that this book would make a valuable addition to any gas man's library, and additional copies can be obtained, while the supply lasts, at $1 a copy, by writing to G. R. Spindler, Director of the School, West Virginia University, Morgantown, West Virginia.

Federal oil taxes show consumption decline in 1938

Effects of the 1938 recession upon the petroleum industry were graphically disclosed January 24 in preliminary figures compiled by the Bureau of Internal Revenue, showing that collections from the federal gasoline, lubricating oil and pipe line transportation taxes in 1938 were markedly below those of 1937.

In all three instances the December revenues were under not only those of November but of December, 1937, receipts from the gasoline tax being $16,936,818 against $18,808,894 the preceding month and $17,585,707 in the previous year, while the lubricating oil tax returned only $2,109,251 against $2,469,541 in November and $2,558,476 in December, 1937, and pipe line transportation turned in $939,765 against $1,013,355 in November and $1,074,546 in December, 1937.

Preliminary figures on the year's collections give the return from the gasoline tax as $200,880,797 against $203,025,380 in 1937; lubricating oil, $30,495,339 against $33,681,591, and pipe line transportation, $11,599,693 against $12,304,202.

The greater part of the loss in revenues accrued during the last half of the calendar year, the bureau reported, in which period revenues from the gasoline tax showed a drop of $2,767,282 as compared with the corresponding months in 1937, lubricating oil tax collections declined $1,069,381 and receipts from pipe line transportation were down $917,337.

However, the figures showed, the trend in these taxes was in line with the experience with other levies, 49 out of 68 classes of taxes showing losses for the last half of 1938 as compared with 1937.

The downward trend in 1938 brought to an end a long period in which demand for oil products increased steadily, as indicated by tax collections. The 1937 revenues from the gasoline tax showed an increase of $16,500,000 over 1936, in which year they had increased $14,000,000 over 1935; lubricating oil showed an increase of $4,700,000 over 1936 which was $166,000 over 1935, and pipe line transportation showed a gain of $1,880,000 in 1937 after a gain of $167,000 in 1936.

Actual collections in 1938, compared with 1937, were shown by preliminary figures of the bureau as follows:

GASOLINE

	1938	1937
January	$ 16,531,890.25	$ 15,054,341.53
February	13,541,199.98	14,564,131.38
March	14,218,796.50	12,970,980.46
April	16,436,553.87	13,591,592.84
May	14,380,266.47	16,287,064.01
June	15,543,571.81	17,561,468.61
July	16,264,420.73	19,590,748.83
August	19,369,069.70	13,721,866.20
September	20,425,513.58	25,154,689.86
October	18,423,802.59	18,267,971.77
November	18,808,893.88	18,674,817.07
December	16,936,817.83	17,585,707.17
Total	$200,880,797.19	$203,025,379.73

LUBRICATING OIL

	1938	1937
January	$ 2,211,295.67	$ 3,535,281.35
February	1,715,439.02	2,016,705.44
March	1,876,304.57	2,057,293.36
April	2,456,640.72	2,317,640.29
May	2,365,109.46	2,971,863.62
June	3,107,636.70	2,950,212.00
July	4,784,067.44	4,371,623.50
August	2,437,055.21	1,809,342.83
September	2,611,544.52	4,054,466.17
October	2,351,453.04	2,581,168.77
November	2,469,541.39	2,457,517.36
December	2,109,251.55	2,558,476.42
Total	$30,495,339.29	$33,681,591.11

PIPE LINE TRANSPORTATION

	1938	1937
January	$ 1,044,468.39	$ 1,019,155.17
February	1,094,979.02	828,161.17
March	1,177,678.03	1,195,186.23
April	890,752.59	881,206.10
May	800,380.10	976,450.41
June	1,065,283.00	960,554.39
July	726,412.68	1,105,461.04
August	1,079,931.08	1,277,829.02
September	764,002.86	1,079,484.16
October	1,002,685.72	983,846.68
November	1,013,354.78	922,322.48
December	939,764.85	1,074,545.86
Total	$11,599,693.10	$12,304,202.71

East Texas Fields

Paluxy pumper extends Talco 3100 feet east

Kilgore.—Productive limits of the Talco field were expanded 3100 feet east for an over-all length of 10.6 miles when Humble Oil & Refining Company's Temple 1, W. N. Baker Survey, pumped 20 barrels of pipe line oil hourly from Paluxy pay at 4322-32 feet. Pipe was cemented on bottom, then gun-perforated at 4318-25 feet.

Northeastern Leon County gained a new wildcat project involving a joint test by Humble Oil & Refining Company and Sun Oil Company, owners of the bulk of the acreage. Derrick has been erected for E. F. Swift 1, H. W. Sublett Survey, A-779, situated 4½ miles northwest of Woodbine production in the Navarro Crossing field, Navarro County. Humble's Tryon 1, near the south edge of the Navarro Crossing area, was awaiting production test after logging top of the gas-oil contact at 5870 feet. The test was cored to 5880 feet. Pipe was cemented 3 feet off bottom.

Core drilling in two East Texas counties

Shreveport.—Core drilling was under way last week on wildcat blocks in two counties in East Texas bordering the Louisiana line. At Harleton, Harrison County, Edson Petroleum Company and W. C. Windsor are core drilling an 8000-acre block, and in the

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northern part of Sabine County, Shell Petroleum Corporation has two core drilling units at work. The latter also has a seismic unit working near Bryan's Mill in northwest Cass County.

In San Augustine County, three miles northeast of San Augustine, E. B. Larue and A. L. Englin, the latter of Lufkin, the former of Athens, Texas, have taken option on an 8000-acre block around the Thomas Wright and adjacent surveys.

Plan Lower Marine test in Waskom field

Shreveport. — What is reported planned as a lower Marine test for the old shallow Waskom field, Harrison County, Texas, was started last week when Arkansas Fuel Oil Company started moving in materials for Davis 1, James Adams Survey (113-acre tract), located 1043 feet south and 876 feet west NEc 113-acre tract. This tract is 1½ miles north of the same company's C. M. Abney 1, drilled more than a year ago and completed after much difficulty following a gas blowout at 4825 feet in the Glen Rose series. It had been started as a deeper test.

Texas seeks to recover Duval County lands

The State of Texas has filed suit in 53rd District Court at Austin, seeking to recover three tracts of public school land in Duval County. Santa Clara Oil Company and 87 other defendants were named in the action, and an effort will be made to recover $500,000 in damages.

The tracts, adjacent to each other, are about 25 miles northwest of San Diego, lying south of the GC&SF and GB&CNG Surveys in Duval County. About 300 acres are included in the leases.

EAST TEXAS Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Joiner Area—		
Blackwell O&G Co., S. Stone 9-B (32½-ac)	6000	3649
Humble, Kangerga 75-A (333¼-ac)	3500	3689
Geo. B. Ray Est., Pinkston 14 (49-ac)	7000	3585
Kilgore Area—		
Byrd-Frost, Inc., Watson 5 (9.01-ac)	6500	3585
General American Oil Co., Sexton 16 (100-ac)	600	3596
Gulf, Sexton 24 (165.58-ac)	1500	3709
Humble, Laird 97-B (568.53-ac)	2400	3614
Patrick Prod. Co., Watson 4-A (10-ac)	7000	3647
Shell, Russell 30 (126-ac)	7300	3755
Russell 31 (126-ac)	7200	3803
Longview Area—		
McMurrey et al, Snoddy 7 (10-ac)	5500	3590
Shell, Hampton 30 (169-ac)	5000	3735
Midas Oil Co., Bacle 5 (7.3-ac)	6400	3618
Anderson County (Long Lake)—		
J. J. Minton et al, Palestine First Nat'l Bank 1 (32-ac)	¶85	5345
Franklin County (Talco)—		
Humble, Leake 7 (191.9-ac)	287	4329
Nathan Pipe & Supply Co., Bates 1	274	4307
Freestone County (Wildcat)—		
A. J. Willis et al, Freedman 1	*	4000
Houston County (Wildcat)—		
Cooke & John Mayo, Walling-Shell 1	*	6118
McLennan County (Wildcat)—		
Carmox Oil Co., Swift 1	*	2489
R. E. Lynch & A. T. Culbertson, A. B. Lucas 1	*	898
Russell & Gerdes, Trippett 1	*	480
Titus County (Talco)—		
Humble, Myra Galt 1-W (input well)	*	897

* Failures; † Junked; ¶ Million cu. ft. gas.

Southwest Texas Fields

McCampbell production extension west appears probable. Vicksburg production at Samfordyce being attempted.

Corpus Christi.—McCampbell district of San Patricio County gained further attention late in the week with casing being set to 8310 feet, bottom of the hole, in Richardson Petroleum Corporation's O. A. Sherwood 1, one mile west of production. The well is generally reported to have cored an excellent oil showing in the 6800 and 7100-foot levels. It also is said to be in a sand at the bottom of the hole.

The well was drilled in Lot 10, Block 80, of the McCampbell Subdivision, and is on a farm-out from Grote and Crogey, most active operators in the field at this time.

R. B. Bryant's Morgan and Meginnis 1, Lots 3 and 4, Block 204, Burton and Danford Subdivision, extended production of the field to within one location of the Aransas Pass Townsite by flowing 535 barrels of oil per day through 3/16-inch choke. The test found sand at 7120-41 feet, but completion was through perforations at 7129-38 feet. The test performed in an excellent manner, showing pressures of 600 pounds on tubing and 750 pounds on casing.

The completion of the Bryant well brings about an offsetting program which will result in the drilling of the town lots. This extension had been anticipated by the city and rules and regulations were set up to prevent waste. The town has been unitized, allowing only one well to every two blocks, or a drill site ranging from 8 to 12 acres. Other rules have made this an assured conservative development.

Riverside, Nueces County's hot spot, received more set backs, the offset to the discovery oil well finding salt water and a west outpost running 271 feet low. Republic Natural Gas Company's Seaboard Oil Corporation 1, Block 3, and 6000 feet southwest of production, was abandoned at 5525 feet, after showing salt water in the discovery pay as well as several lower sands.

H. D. & D. Inc.'s Wright 1, south offset to the oil producer, found sand at 4992-5004 feet with oil and gas odor, shale 5004-11 feet, sandy shale, sand and shale with odor at 5011-24 feet, sand with good oil odor at 5024-29 feet. Drill stem test at 4992-5004 feet recovered only drilling mud, but test at 4017-29 feet developed salt water. It is drilling ahead. Henshaw Brothers' Countiss 1, 5204.4 feet due west of the oil well, is coring below 5070 feet, having found the base of the Greta at 4391 feet. The elevation is 31 feet, derrick floor, making the formation 271 feet lower than the producer.

Rutherford Oil Company and Royal Oil & Gas Corporation extended the La Rosa field of Refugio County 3500 feet to the northeast and opened a fourth producing sand. The well is Schirmer B-1, NE Section 1, which is in sand at 6108-14 feet. It was carried to 6425 feet, having found the deepest field sand at 6328-38 feet carrying salt water. Casing was landed at 6377 feet and perforated 6108-11 feet. On potential test, it flowed 154.54 barrels of oil per day through ⅛-inch choke with 625 pounds tubing and 950 pounds casing pressure. The present sands are at 5500 feet, distillate; and 5900 and 6300 feet, oil.

Gravis and Doran's Clark 1, which apparently has opened a new field more than one mile east of the East Alice field production in Jim Wells County, is flowing oil, gas and wash water from perforations at 4834-43 feet. The well had been drilled to 5330 feet, plugged back and perforated at 5138-42 feet, where it flowed gas and distillate. It then was decided to plug back again for further tests of the formations.

Testing Vicksburg sand at Samfordyce

McAllen, Texas.—Development of Vicksburg production in the Samfordyce field of Hidalgo County is being attempted by Fohs Oil Company in Ed Sullivan 1. The well, in Share 254, Porcion 39, is northeast offset to Phillips Petroleum Company's Flores 1, 5800-foot distillate producer in the Vicksburg sand. The Fohs test cored a gas sand at 3373½-92½ feet and was coring ahead. A 3100-foot Vicksburg gas sand was opened in the main field about two years ago, followed by the 5800-foot Vicksburg distillate producer late last year. The results of the Fohs well will have an important bearing on the district, as it is expected to pave the way to future drilling.

Pan American Production Corporation has plugged back from 8123 feet to 6000 feet in Juan de la Vina 1, in Share C, Mestinas Grant, wildcat in the Mestinas district, Hidalgo County. It will recore sands at 6500-30 feet and 6691-6721 feet, both of which showed distillate and gas when first drilled. The well also had a sand at 7985-8021 feet, where a drill stem test recovered gas, salt water and a show of distillate. The company, associated with other operators in the area, plan to drill several wells, construct a recycling plant and natural gasoline unit.

Abandonment of the McAllen field prospect in Hidalgo County looms as a result of landowners to fail to participate in a pool which would call for drilling of one well to every 400 acres. McCollum Exploration Company would carry on the development of the area on this basis, probably constructing a recycling unit after the drilling of six wells.

Sun Oil Company's Olivarez 1, in the Sun district, Starr County, showed salt water and gas on a drill stem test at 5075-92 feet, and again at 5153-79 feet, both in the Vicksburg. It was coring ahead. McKinney 4, after drilling to 5382 feet, plugged back and per-

forated at 4610-23 feet, which developed into a distillate sand. It is now shut in.

Transwestern Oil Company and Rowan and Hope are preparing to drill W. I. Cameron 1, tentatively located in the southwest corner of Section 228, 2 miles northeast of the Rincon field. The location is subject to revision.

La Blanca field to be repressured

San Antonio. — One of the most interesting and important developments attempted in South Texas is underway in the La Blanca field under the direction of Pantano Oil Company of Houston. It is a new repressuring method, which is an effort to gain a pay-out, if not a profit, on a field materially damaged by a wild well.

As a first step in the program, the company has plugged backs its McDougall 1 from the 7800-foot sand, perforated casing at 7150-80 shots and on a short gauge flowed 100 barrels of distillate per day through 7/16-inch choke with 2700 pounds working pressure. One mile to the north of this well, the company plugged back No. 1 J. C. Engelman from the 7800-foot zone and perforated at 7460-7500 feet with 80 shots and it was completing as a life sized producer.

It is anticipated that the wells will produce from the 7500-foot sand through one string of tubing and that another string will be run to the 7800-foot zone on a packer for the purpose of repressuring that level. The recycling process is expected to provide an outlet for the gas produced in excess of the allowable and at the same time rejuvenate the apparently depleted sand.

D. D. Davenport et al's C. H. Swallow 1, drilled to the 7800-foot sand was the cratered producer which drained this high-pressure reserve. For the first time in thirteen months the field was free from the blasting road of escaping gas, for the high-pressure well was killed and brought under control. The well blew out on January 5, 1938, cratered and engulfed an old hole previously abandoned.

Within a short time the well became a flaming crater 50 feet deep and 150 feet wide. It was blasting about 500 barrels of distillate and 12,500,000 feet of gas into the air every 24 hours. After several weeks, fire-fighting crews succeeded in snuffing out the flame.

The flow was then diverted through valves on the control head and thence through six huge separators, which stripped the distillate and popped the gas into the air.

After thirteen months of flowing, pressure dropped from its original high of nearly 3000 pounds to about 1300 pounds. A battery of pumps was put to work forcing a column of clear water into the hole. When pressure reached 1325 pounds, the well was killed.

Owners of the well estimated they had spent about $70,000 over and above the value of the distillate recovered in attempts to kill it. Figured at a value of 3 cents per 1000 feet, which is the ordinary cost of natural gas at the well in a number of South Texas fields, the gas which escaped into the air during the thirteen months had a value of $107,250. At the minimum domestic rate charged in the valley the gas would be valued at $4,290,000.

Southwest A.P.I. to meet in San Antonio

San Antonio will be host to several hundred leaders of the oil industry when the Southwestern District of the American Petroleum Institute Division of Production holds its spring meeting there March 16 and 17. An elaborate technical and entertainment program is in its final stages of formulation to make this one of the most eventful meetings ever held.

Al Buchanan, San Antonio drilling contractor, has been placed in charge of arrangements for the affair, and he is at this time appointing a group to work out final details. His announcements will be forthcoming in the near future.

E. P. Hubbard, with Gulf Oil Corporation in Houston, has been made chairman of the program committee. Others on his committee are: R. S. Dewey, Humble Oil & Refining Company, Midland; T. W. Johnson, United Gas Company, Shreveport; R. H. McLemore, Sun Oil Company, Beeville; L. A. Ogden, The Pure Oil Company, Fort Worth; P. D. Torrey, The Sloan and Zook Company, Houston; J. E. Warren, Carl B. King Drilling Company, Dallas.

They have secured a number of outstanding production experts to discuss various problems of the industry. Through their efforts, the latest and most advanced methods of oil development and production will be discussed.

Due to the large number of oil men expected to be present at the meeting, it has been suggested that reservations be made immediately direct to San Antonio hotels. The Plaza hotel will be the headquarters for the convention, but other hotels of the city also will provide special services to visitors.

The numerous constant advancements in production, trend toward deeper drilling, repressuring, recycling, gas oil ratio control, etc., give rise to many subjects of vital interest to the industry. Many operators, therefore, find these meetings of great importance to their particular operations.

SOUTH TEXAS Completions

Company, Well and Location	Init. Prod. Bbls.	Depth.
SAN ANTONIO DISTRICT		
Bastrop County—		
Odgen & Riddle, Riddle 4 (Riddle)	72	1767
Caldwell County—		
Crouch, Moses 5 (Salt Flats)	61	2681
Martell, Davis 4 (Salt Flats)	93½	2705
Taylor Refining, Miears 4 (Dale)	*	2799
Guadalupe County—		
Glenn, Appling 1, (wc) ¾ mi nw Sullivan	96	2317
McCabe, Denman 2 (Darst Creek)	50	2620
McNeill, Malear 3 (Darst Creek)	53	2599
Sun, Dowdy 3 (Darst Creek)	400	2527
Williamson County—		
Burnette, Reed 1 (wc) 5 mi nw Liberty Hill	*	1145
LAREDO DISTRICT		
Duval County—		
Argo, Fee-Roden 4 (Hoffman)	199	2653
Cox & Hamon and Gorman-Yoakum 1, (Hoffman) Duval County	*	3602
Cuellar, Cuellar 2-A (Hoffman)	105	2551
Magnolia, Duval Co. Ranch 4 (63) (Casa Blanca)	*	2133
Duval Co. Ranch 18 (201) (Eagle Hill)	15	1465
Miller, Miller 2 (Longhorn)	500	4905
Porter & Blanchard, Yates 1 (wc) 3½ mi se Labbe field	*	3910
Reynosa, Ruiz 1 (Hoffman)	*	2710
Sinclair-Prairie, Garcia 1 (Tesoro)	350	5118
Jim Hogg County—		
Johnson & Robinson, Palacios 2 (wc) 2 mi se Randado field	*	434
McMullen County—		
Boysen & Jones, Hagist 1 (wc) BS&F sur	*	2054
Jones, Ezzell 63 (Ezzell)	224	1567
Webb County—		
Houser & Campbell, Slator 1 (wc) 12 mi sw Aguillares	*	1818
Ohern & Ryan, Garcia 1 (Killam)	72	1995
Zapata County—		
Buffalo, Hinnant 4-A (Mirando Valley)	109	1905
Nordan & Morris, Haynes 3-C (Comitas)	74	1224
Texas Co., Jennings 126 (Escobas)	35	1328
CORPUS CHRISTI DISTRICT		
Brooks County—		
Humble, McGill 4 (Kelsey area) (wc)	625	4725
Southern Minerals, Procter 1 (wc) Gype Hill area	*	7726
Calhoun County—		
Humble & Plymouth, Welder 25-A (Heyser)	*	5605
Jim Wells County—		
Bowles, Ragland 8 (Alice)	450	5300
Buchanan & Blanco, Rattan 6 (Alice)	450	5020
Coates, Stillwell D-1 (A) (Alice)	325	4998
Graham & Mosser, Bankers Mortgage H-1 (E Alice)	450	5337
Nueces County—		
Republic, Seaboard 1 (wc) Riverside area	*	5525
Sinclair-Prairie, State 5 (Flour Bluff)	650	6668
Refugio County—		
Quintana, O'Connor C-37 (Tomoconnor)	3000	5925
Williams 7 (Tomoconnor)	1500	5925
Rutherford, Shirmer B-1 (wc) La Rosa area	500	6425
San Patricio County—		
Bryant, Meginnis 1 (McCampbell)	1200	7141
Graham, Moore 4 (McCampbell)	1250	7166
Robinson 1 (McCampbell)	1200	7166
Humble, Speer-Fee 2 (E White Point)	450	5676
Plymouth, Ficke 3 (E White Point)	500	5635
Shell, Kirk 2 (E White Point)	500	5675
Victoria County—		
Barnsdall, McFaddin 18 (McFaddin)	475	4399

* Failures; † Junked; ¶ Million cu. ft. gas.

Redrilling Edwards limestone fields

San Antonio, Texas.—A program to redrill many of the abandoned well sites in the several Edwards limestone fields of Caldwell and Guadalupe counties is under way. The campaign is meeting with a great deal of success, new producers showing initial flows ranging from 50 to 400 barrels per day. The majority of the work is at Salt Flats, although the Darst Creek, Luling and Branyon sector are active.

An extension of the Spiller district or the opening of an entirely new Austin Chalk-Buda limestone pool in Guadalupe County, is indicated in Frank H. Glenn's A. E. (Mittie) Appling 1, which pumped at the rate of 4 barrels of oil per hour on first tests, then settled to 18 barrels per day. The well, located in the Robert Hall Survey, is about three-quarters of a mile northwest of Sullivan. It topped the chalk at 1946 feet, Buda limestone at 2182 feet, Edwards limestone at 2375 feet. Plugged back to 2215 feet, it was completed in the section between 1968-2225 feet.

Five wildcats to be drilled on Pettus trend

Beeville. — On the basis of a new type of electrical geophysical work, H. R. Cullen plans the drilling of at least five wildcats along the Pettus trend. The first test already has been started on the W. W. Pettus ranch, several miles northwest of Goliad in Goliad County. The second, it is said, will be at the town of Beeville, while two more are projected in Live Oak County. Where the fifth will be drilled is still unknown.

The Pettus trend has seen a material revival of interest during the last several weeks. A number of lease deals indicate that the Sparta-Wilcox play will vitally affect this sector.

Texas Gulf Coast

Buttermilk Slough area wildcat tries to blow out.

Wells indicate double extension for League City.

Houston.—Four miles southwest of Palacios in the Buttermilk Slough area, J. Duncan Survey, Sun Oil Company's Cavallin 1 attempted to blow out last week at 9318 feet after topping a gas and distillate sand at 9313 feet. Over 10 tons of special drilling mud had to be pumped in the hole before it was brought under control. This sand probably corresponds to the deep sand found at Palacios, Matagorda County, where Sun's Bayshore Farms 1 blew out the past year and made a large quantity of gas and distillate.

League City field, Galveston County, was extended south last week by Geo. Echols' Ross Stewart 2 when it came in flowing as the best well yet completed in the field: 160 barrels daily through a 7/64-inch choke. The railroad commission estimated the well would make 1074 barrels daily through a quarter-inch choke. Tubing pressure on the well was 1575 pounds; casing pressure, 1625 pounds. The well was making 744 cubic feet of gas with every barrel of 40 gravity oil. Ross Stewart 2 was drilled to 9285 feet; 5½-inch casing was perforated with 12 shots from 9236 to 9260 feet.

West Outpost Flows

Gulfboard Oil Company and Salt Dome Oil Corporation's Ross Stewart 1, west of production at League City, last week was flowing five barrels of fluid per hour, 15 to 35 percent salt water, through a ⅛-inch choke, with a tubing pressure of 1000 pounds and a casing pressure of 1475 pounds. This well was drilled to 10,001 feet and 5½-inch casing set at 9080 feet was perforated with 24 shots from 8965 to 8975 feet. The operators are moving rig to Ross Stewart 2, 1200 feet south of the above well.

Northeast of production at League City, Phillips Petroleum Company's Patton 1 is swabbing after casing was perforated with 24 shots at 9243 to 9249 feet. A test at 9325 to 9345 feet showed salt water. In the same area, Phillips' Brittnacher 1 was coring in sandy shale at 9165 feet after logging a broken sand with an odor of oil from 9020 to 9030 feet. The operator's Ott 1 was waiting on cement to set at 10,450 feet after setting 7-inch casing. The well cored a sand with an odor of oil around 10,427 feet and this sand will probably be tested first. Another broken sand was cored at 9287 to 9304 feet. The company's Stewart Title Company 1 cored oil sands from 9261 to 9269 feet and from 9269 to 9285 feet. An electrical log was run.

Setting Casing at Bolivar

On the Bolivar prospect, Galveston County, Sun Oil Company was preparing to set casing in Cade 2 at 7850 feet after taking side wall cores around 6508 feet. It is not known what the cores showed. It is believed that the casing is being set to protect the hole and if no sands are found at greater depths the well will be plugged back and tested around 6508 feet.

Kirby Petroleum Company's Daniel 1, northeast of production at Fairbanks, Harris County, has cored a large body of gas and distillate sand and is assured of making some kind of a well. The first gas show reported in the well was from 6745 to 6826 feet. Another broken sand was cored at 6903 feet which showed gas and distillate. Broken sands cored down to 7182 feet showed distillate and gas. The operators were coring ahead below 7260 feet in the Goodykoontz sand at the end of the week.

North of Orange in the Echo area, Orange County, Sun Oil Company again was testing Lutcher Moore 1, B. Johnston Survey, after it had been killed at 9402 feet. The hole was plugged back, perforated with 15 shots from 6320 to 6330 feet, and swabbed wash water with no shows of oil. At 9402 feet the well indicated it would open a new oil field in the Texas Gulf Coast when it flowed 100 barrels of fluid daily, largely salt water.

Three miles east of Mentz in Colorado County, Mills Bennett Production Company's wildcat was shut down for orders at 7505 feet after running an electrical logging device. The well has not cored the Wilcox as yet, but will probably be carried on down to that formation.

Coyle Concord Oil Company is test-

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TEXAS GULF COAST Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Big Creek—		
N. W. Hunter, Lingneau 1	*	6130
Boling—		
Mackhank Oil Co., Farmer C-2 (wo)	281	4845
Bryan Mound—		
Texas Co., Freeport Sulphur 6	*	3503
Cheek—		
Humble, Broussard Hebert 1	*	7792
Fairbanks—		
Amerada-Stanolind, Bullimore 4	168	6854
Union Prod. Co., Warneke 2	131	6841
Friendswood—		
Humble, Kiesling & Dixon 10	592	6052
Hardin—		
Humble, Partlow 8-A	276	7782
Hastings—		
Stanolind, Curkeet D-10	614	6080
League City—		
Geo. Echols, Ross-Stewart 2	1074	9285
Old Ocean—		
Harrison & Abercrombie, McDonald 1	300	10,097
Spindletop—		
British American-Merit Oil Co., Gladys City 3	*	6590
Thompson—		
Humble, Lockwood Sharp 43 X	*	3800
Tomball—		
Humble, Kobs A-5	165	5567
Treichell 6	492	5566

* Failures; † Junked; ¶ Million cu. ft. gas.

ing Powell B-4 at Garwood, Colorado County. Last week the well was perforated with 10 shots from 5923 to 5926 feet and it was flowing salt water with a slight trace of oil. Tubing pressure was 600 pounds and casing pressure was 1300 pounds.

South of Peyton Brothers' Kirby Lumber Company 3, which opened the first Wilcox production for Ace field, Polk County, Shell Petroleum Corporation's Doucette 1, P. A. Sublett Survey, was coring in shale at 7150 feet at the end of the week and should be down to the Wilcox sand this week. Peyton Brothers' well is flowing 180 barrels of pipe line oil daily, 24.2 gravity, through a 3/32-inch choke with a tubing pressure of 650 pounds and a casing pressure of 2150 pounds. The well was completed at 7762 feet.

Two for Cheek

Cheek, Jefferson County, will receive two new tests. One by Humble Oil & Refining Company and the other by Shell Petroleum Corporation. Humble abandoned Broussard and Hebert 1 at Cheek last week at 7792 feet. Sand with an odor of oil and salt water was cored. The company's Failor 1, northeast of production at Cheek was flowing 4½ barrels of oil per hour through a quarter-inch choke with a tubing pressure of 750 pounds.

On the west flank of Spindletop field, the first producing field in the Texas Gulf Coast, Jefferson County, British American Oil Company and Merit Oil Company abandoned another well. Gladys City 3 was plugged at 6592 feet in shale. No shows of importance were cored.

Southwest of production at Clear Lake, Harris County, Humble Oil & Refining Company's Hutcheson 3 is setting casing after topping gas sand around 5680 feet. The hole is bottomed at 5843 feet.

Tide Water Associated Oil Company is moving in material for another flank test at Eureka field, Harris County. Roy 2 is 3100 feet west of Roy 1 and 548 feet from the north and south lines and 466 feet east of the west line of a 105-acre tract in the John Rienerman Survey.

High-pressure fittings proposed for Stratton

High-pressure fittings for wells in the new Stratton field, Nueces County, were proposed at a hearing before the Texas Railroad Commission last week. The Corpus Christi Corporation, operators and the only producers in the area, and owners of 8000 acres of leases in the field, presented testimony to show that unusually high pressures had been encountered in the field between 6400 and 6800 feet. They pointed out further that no firm formation that would form a safe casing seat is found above the Lagarto clays, which are about 300 feet thick in this section and are topped at 1100 feet.

For this reason, operators recommended that the surface casing be set in these clays, for a minimum of 1500 feet, and be cemented to the surface; that if seven inch casing was used on the oil string, 26 pound pipe be required, and that this string be cemented either to the bottom of the surface casing, or preferably to the surface.

Six thousand pound fittings will be used

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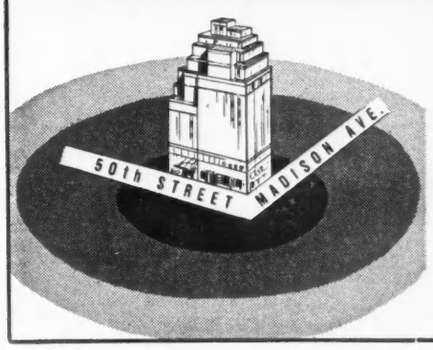

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on all wells, and while 10 pound mud was considered sufficient to 6400 feet, 13 pound mud should be used for deeper drilling, operators said.

The field was first discovered in April, 1937, and is now producing 58 gravity distillate with a gas-oil ratio of approximately 33,000/1.

Rhodes operators want permission to repressure

Operators from the Rhodes pool, Jack County, requested permission to repressure the area at a recent hearing before the Texas Railroad Commission. James E. Allison, representing operators in the pool, estimated that if the plan was approved, ultimate recovery from this date forward would be doubled.

There are now 55 wells which would be affected by the operation, and they are producing from two sands. The plan contemplated would require the return of all gas now produced from the area, save that used for light and fuel, and enough gas added to begin the pressure increase desired.

The plan provides for the location of key wells in a manner that will permit each producer to offset a key well. Should conditions warrant, the operators expect to reverse the process from time to time, using the producers as input wells to maintain uniform reservoir pressure.

MYRL MANNSCHRECK, West Texas scout for the Mid-Continent Petroleum Corporation, has been transferred from Midland to Shreveport, where he will be assigned to a district in Louisiana.

South Louisiana

St. Bernard Parish wildcat indicates new field. First commercial producer recorded for Chalkley.

Lake Charles.—South Louisiana's third new oil field of the year may be opened in St. Bernard Parish by Vendome Petroleum Company's Kennelworth 1, located east of St. Bernard, which was preparing to go deeper after setting 9⅝-inch casing at 10,809 feet with the hole bottomed at 10,863 feet. The well cored a broken sand showing oil from 10,597 to 10,650 feet, where an electric log showed 14 ohms on the normal curve and 20 ohms on the third curve. If the well fails to find a deeper sand, it will be plugged back to test at this level.

Continental Oil Company's Realty Operators 2 at Convent, St. James Parish, blew out last Friday and caught fire when coming out of hole with a core from 8235 to 8240 feet. According to reports, the derrick and equipment was lost. Convent was proven productive by Continental Oil Company's Realty Operators 1, August 1, 1938, when the well came in flowing oil at 6358 feet. The 8235-foot horizon is a new sand for the field.

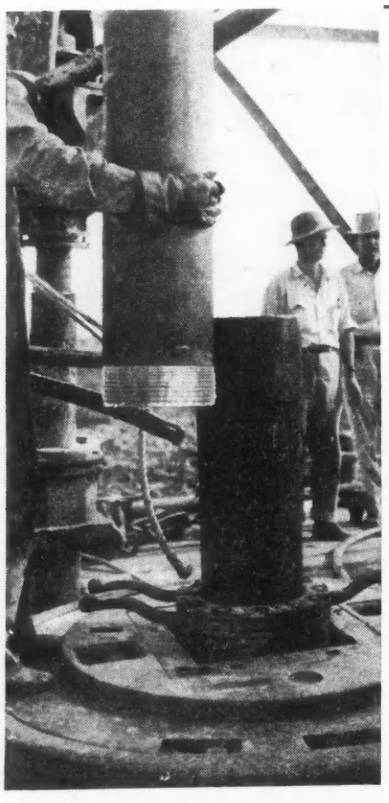
The first profitable oil well to be completed in the Chalkley field, Cameron Parish, is Humble Oil & Refining Company's Cameron Parish School Board 1, which came in last week flowing 22.9 barrels of 38-gravity pipe line oil per hour through a 3/16-inch choke with a tubing pressure of 1350 pounds. The well was drilled to 9101 feet, casing was set and perforated with 39 shots from 8949 to 8959 feet. Chalkley field was discovered last year when Humble Oil & Refining Company's Hanszen 2 came in flowing about six barrels of high gravity distillate daily. The discovery well has been the only oil well completed in the district. Humble Oil & Refining Company has made location for School Board 2, 466 feet north and 466 feet east of the center of the Section 16-12s-6w, Cameron Parish.

Jennings Deep Sand

A new deep sand was found on the southwest flank of Jennings field, Acadia Parish, last week by Superior Oil Company. The company's Leckelt 16 was perforated from 8204 to 8229 feet. On a potential test the well flowed 354 barrels of 36-gravity oil daily through a 12/64-inch choke with a tubing pressure of 2475 pounds and a casing pressure of 3025 pounds.

In Lake Pontchartrain, Orleans Parish, W. T. Burton's State 1 wildcat, is preparing to make a test around 8135 feet after drilling to 11,149 feet. A string of 9⅝-inch casing was set at 8165 feet.

In St. Martin Parish, Magnolia Petroleum Company's M. Francois 1 was drilling in shale at 8301 feet and is after running an electrical log to 5032 feet. It is reported that a show of oil was noticed on the ditch around 3900 feet. North of St. Martinville field, St. Martin Parish, Continental Oil Company's Standard of Kansas 1 was drilling in shale at 8301 feet and is



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SOUTH LOUISIANA Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Chalkley—		
Humble, Cameron Parish School Board 1	552	8959
Charenton—		
Kinsley Oil Co., Hertel 3	190	1820
Pan American, Ecuer B-4	*	3012
St. Mary Oil Co., Robichaux 5	24	1135
Jennings—		
Superior, Leckelt 16	288	8229
East Hackberry—		
Union Sulphur, Doiron 11	816	7303
Quarantine Bay—		
Gulf, Orleans Levee Board A-2	680	8187
Sulphur—		
Union Sulphur, Fee 828	96	3649
Venice—		
Tide Water, Buras Levee 3	*	2339

* Failures; † Junked; ¶ Million cu. ft. gas.

reported to be running 500 feet higher than other wells in the area.

To Try at Woodlawn

Union Sulphur Company has made location for a well at Woodlawn field, Jefferson Davis Parish. Donavan-O'Connor 1 is 268 feet east and 330 feet south of NWc NW¼ SE¼ Section 12-9s-6w. The concern's Miller 2 has been plugged back to 5910 feet from 9111 feet in shale.

On the flank of Fausse Point, Iberia Parish, The Texas Company's State Lake Fausse Point 5 was drilling in water sand at 10,735 feet at the end of the week. It is the deepest well drilled at Fausse Point.

At Jefferson Island field, Iberia Parish, The Texas Company's Jefferson Island Salt Mining Company 2 was drilling at 7822 feet in sandy shale with an odor of oil. The well logged a sand with a show of oil from 7772 to 7781 feet, which is reported to be the same sand found in Jefferson Island 1, which is being worked over.

South of production at Lirette, Terrebonne Parish, Humble Oil & Refining Company has made location for Smith 1, 500 feet from the south line and 600 feet from the east line of the NW¼ NE¼ Section 53-19s-19e. It is south of Ellender 2 which is now drilling at 10,000 feet in shale.

On Pikes Peak prospect in Pointe Coupee Parish, Falcon-Seaboard's Hobgood 1, Wilcox test, is digging pits and building roads. Rig will be moved in within the next week or so from William Helis' wildcat in the Chalmette area. Leases and royalty are still being purchased in the area around this important wildcat. The well is contracted to 8000 feet or 500 feet into the Wilcox formation.

Superior Oil Company has made location for a wildcat in Grand Lake, Cameron Parish. It is State 1, 5650 feet west and 8500 feet north of the northeast corner of Section 24-13s-4w, in Grand Lake. The operation will be southwest of Pure Oil Company's development at Mallard Bay. The new wildcat will probably be carried to 10,000 feet or deeper.

Shell Petroleum Corporation's Peters 2, second well at South Houma field, Terrebonne Parish, was coring in sandy shale with a slight show of oil last week at 9866 feet, topped at 9820 feet. The producing sand is found below 10,000 feet.

Humble Oil & Refining Company is preparing to test the Rosedale prospect in Iberville Parish with Mortgage Loan Company 1, 800 feet from the northwest line and 1600 feet from the southwest line of Section 74-7s-10e. This geophysical prospect was worked with reflection seismograph by Humble Oil & Refining Company in 1934 and is reported to have found a good "high" in the district. Barnsdall Oil Company, Gulf Oil Corporation and Sun Oil Company are the other principal lease holders around the prospect.

Mississippi leasing activity continues

Jackson, Miss.—Considerable leasing and geophysical activity is under way in North Mississippi, as well as in the southwestern part of the state "in the trend." In the northern part of the state in Oktibbeha County, near Sturgis in township 20 south, range 12 east, Witte and associates are assembling a 10-year block. In Yazoo County, six miles east of Dorn, Thomas H. Robertson has assembled a block of 4000 acres in the southwest part of township 10 north, range 1 east. This is 10 or 12 miles from Union Producing Company's 20,000 acre block on which location was recently made near Flora Madison County, for a 4500-foot test. B. B. Jones owns considerable royalty in this block. Houseman and associates of Shreveport, Louisiana, are leasing actively in LeFlore County in townships 18 and 19 north, ranges 1 and 2 west, and in the same county, Magnolia Petroleum Company is taking some leases. Ryan and Anderson of Jackson have agreed to drill a 3000-foot test within six months on their block in southeast part of township 18 south, range 18 west, and northern part of township 19 south, range 18 west, Lowndes County, near Columbus. Union Producing Company has a seismograph unit in Yazoo County and a shooting unit in Madison County.

In south Mississippi "in the trend" Barnsdall Oil Company has a gravimeter unit working in Franklin County. Sun Oil Company is negotiating with W. S. F. Tatum, head of a lumber company at Hattiesburg, for permission to make a magnetometer survey through the company's holdings from Oloh to Baxterville, Lamar County, to tie into the series of tests Sun Oil Company and associates drilled in that county in 1936 and 1937 that found

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the first interior salt dome in Mississippi. In Walthall County, for the account of Navarro Oil Company of Houston, D. D. Cashin is leasing in township 4 north, range 11 east. In townships 3, 4 and 5 north, ranges 10 and 11 east, Wanette Oil Company assigned 2000 acres to Royal Oil & Gas Company.

In Hinds County, G. Jeffreys leased 7500 acres in township 7 north, range 2 west and he and E. R. Owen of Jackson took a block in township 7 north, range 3 west. Southern Natural Gas Company late in 1937 leased 11,000 acres scattered in townships 5, 6 and 7 north, ranges 1, 2 and 3 west, Hinds County, and this acreage was forfeited when first rentals became due.

Survey publishes Noble and Clay City oil maps

Publication of oil and gas development maps for the Noble and Clay City areas were announced last week by the Illinois State Geological Survey.

The Noble map covers Townships 1 to 3 north, Ranges 9 to 11 east and 14 west, the Nable and Schnell pools, and the Clay City map includes Townships 1 to 3 north, Ranges 6 to 8 east, the Clay City, Flora, Cisne and Rinard pools.

Towns, principal roads, section, township and county lines, well locations, rigs and drilling wells, oil, gas and abandoned wells are shown on the maps. The scale is 2 inches to the mile.

North Louisiana Fields

Second deep well at Shongaloo makes gas-distillate flow. Series of salt water wells is halting interest at Vivian.

Shreveport.—The second gas-distillate well from the lower Marine was completed at Shongaloo, Webster Parish; plans were announced for a 9,000-foot lower Marine test on the north end of the shallow Monroe gas field in the Permian lime "trend" from South Arkansas, and the drilling campaign in the Tokio horizon in the Vivian end of the old Pine Island field, Caddo Parish, faded rapidly as five tests in that area ran into salt water, three being in course of abandonment and the other two trying to shut off water to complete.

Shongaloo's second lower Marine well was, in a way, a disappointment because it was gas-distillate when an oil well had been hoped for, location of the second well being one mile south and down structure from the first well. The new well is Magnolia Petroleum Company's H. M. Branton 4, C NE 6-22n-9w, Webster Parish, completed at 9203 feet, making 150 barrels of 62-gravity distillate and two million cubic feet of gas daily first 24 hours and subsequently showing 93 barrels of distillate and 1,511,000 cubic feet of gas in 24 hours through 3/8-inch choke; gas/oil ratio was 12,400 to 1. The same company's Roseberry 1, C SE 29-23n-9w, is drilling below 8510 feet. H. M. Branton 4 checked 170 feet low compared to the lower Marine discovery well at Shongaloo, Magnolia Petroleum Company's Frank Sexton 1, Section 32-23n-9w, completed at 8990-9010 feet. With elevation of 227 feet Branton 4 topped massive anhydrite at 4400 feet, topped Travis Peak at 5900 feet, topped lower Marine (Cotton Valley) at 7750 feet, topped Bodcaw "E" sand of the lower Marine at 8193 feet and the Davis "F" sand at 8442 feet. Seven-inch casing was cemented at 9138 feet.

Union Producing Company will drill a 9000-foot test on the north flank of the Monroe Uplift, Tensas Delta Lumber Company A-1, Section 9-22n-4e, Morehouse Parish, as soon as water subsides from location. This test will be in the southeast Permian lime "trend" from Snow Hill, Ouachita County, Arkansas, where the first Permian production in this territory was found in 1936.

The end of the flurry of drilling in the Vivian end of the Pine Island field where 2 small wells, one-half mile apart, were completed recently in the lenticular Tokio horizon, is in sight with 5 operations showing salt water last week and no new locations were made. Rigging was halted at two locations that had not started making hole. Altogether 16 locations were made in this locality with materials moved to 9 locations, 7 of which were drilled or are drilling to this 2400-2500-foot horizon.

Shreveport's twelfth oil well in the basal Glen Rose lime was completed by Harry Hanbury at Sample 1, SE SW 23-18n-14w, Caddo Parish, from 5½ feet of saturated lime. Two new locations were made in the Shreveport field last week, both in Section 26-18n-14w. Another operation was arranging to test, Ford Oil Corporation's Dorian 1, SE NE 34-18n-14w, which logged porous lime from 5574-79 feet and tight lime from 5579-99 feet, total depth. It offsets a producer.

The Shreveport City Council accepted the bid of W. C. Feazel, local operator, for the municipal golf course lease, an 80-acre tract in Section 35-18n-14w, inside the city limits. Feazel's bid was $5000 cash, regular eighth royalty, additional 3/16 over-ride for wells

NORTH LOUISIANA Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Caddo (Shreveport)—		
Harry Hanbury, Sample 1, 23-18n-14w	600	5568
Sabine (Zwolle)—		
Posey et al, J. W. Hale 3, 12-7n-13w	100	2513
Hunter Co., Bowman-Hicks 8, 13-7n-13w	*	2565
Webster (Shongaloo)—		
Magnolia, H. M. Branton 4, 6-22n-9w	¶ & 150	9203

* Failures; † Junked; ¶ Million cu. ft. gas.

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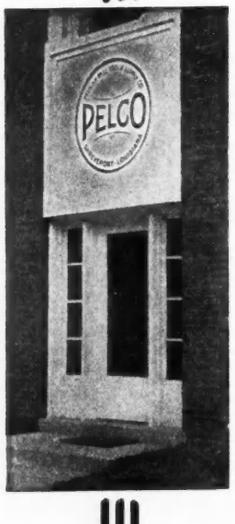

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SHREVEPORT LOUISIANA

Lake Charles—Houma—Converse
New Iberia—Monroe
Cotton Valley—Greggton
Magnolia—Houston

above 150 barrels daily; ⅛ over-ride for wells between 50 and 150 barrels daily; and 1/16 for those below 50 barrels daily. No specifications were contained as to number of wells to be drilled. Being inside the city limits, under present rules one well to each 10 acres could be drilled. Contract that remains to be drawn will embrace these matters.

Bottom-hole pressure tests were made during February of the 12 wells in the Shreveport field by engineers of the Louisiana Conservation Commission as a basis for the allowable for March. The Shreveport office recommended allowable for individual wells based on these data. Heretofore, the allowable has been a flat 300 barrels daily per well. The first well was completed last July 15.

Leslie Moss, leasing in Caddo Parish south of Mooringsport and north of Blanchard for a major company, has secured over 1000 acres around the southern part of Township 19 north, Range 15 west. T. L. James of Ruston has joined those securing leases around the flanks of the old Haynesville field, Claiborne Parish, Township 23 north, Range 7 west. Tide Water Associated Oil Company assigned 80 acres it held in Section 19-21n-10w and in Section 19-21n-9w, at Cotton Valley, to H. L. Hunt.

Union Producing Company's Walker Unit 1, C 30-18n-8w, Webster Parish, 9000-foot test at Sibley, was fishing last week for 10 joints of drill pipe. Total depth is 7837 feet. Bad roads held up perforating and testing in the basal Glen Rose of Arkansas Fuel Oil Company's Gayoso 2, C SW SE 14-16n-10w, Bienville Parish. Total depth is 6300 feet.

H. L. Hunt and Seaboard Oil Corporation have resumed negotiations with lease owners in the Bear Creek district, Bienville Parish, Township 16 north, Range 6 west, relative to unitizing acreage for a series of tests. This field produces gas-distillate from the Basal Glen Rose lime at 6785 feet and from the Travis Peak at 7365 feet.

Louisiana has 21 permits in north, 27 in south

Shreveport.—Forty-eight drilling permits were issued last week by the Louisiana Conservation Commission of which 21 were in North Louisiana, divided among the following parishes: Caddo, 16; Grant, 2; LaSalle, 1; Sabine, 1; and Webster, 1. The 27 in South Louisiana were in the following parishes: Acadia, 1; Ascension, 2; Avoyelles, 3; Calcasieu, 1; Cameron, 4; Evangeline, 3; Iberia, 1; Iberville, 1; LaFourche, 1; Plaquemines, 3; St. Mary, 6; and Terrebonne, 1.

Seek to flood Oklahoma leases

Crusade Oil and Gas Corporation has requested permission of the State Corporation Commission of Oklahoma to water flood approximately 65 acres in Rogers County. The tract is in Sections 22 and 28-26n-17e, where Peru sand has been producing from 400 feet since its development in 1907. At this date, only six wells remain productive and these only make small volumes.

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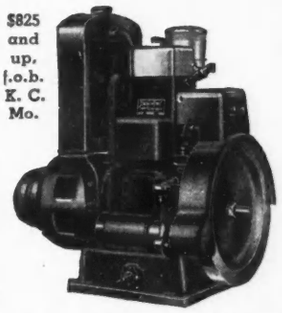

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Arkansas Fields

Three deep wildcats are abandoned; 10 tests start

El Dorado, Ark.—Three deep wildcat tests, two of which went to the Permian lime, were abandoned last week in South Arkansas. Location for a second test in the new Atlanta field, Columbia County, and new locations in Buckner, Magnolia, Schuler and Rainbow City were announced in one of the most active weeks in some time in number of new locations.

J. K. Wadley and associates' Taylor 1, C NE SW 15-19-26, LaFayette County, along a supposed projection of the Rodessa Fault northeast, was abandoned at 6802 feet after failing to get production in any of the Rodessa Glen Rose sands and finding the Pettet (basal Glen Rose), logged from 6650 to 6700 feet to be hard lime.

In the same county, Shell Petroleum Corporation and Ohio Oil Company were abandoning Warren 1, SE SE 13-16-24, at 7418 feet after plugging back to 7182 feet and testing salt water with only a showing of oil at 7177 feet. Poor permeability of the Permian had already condemned this test. Top of the Permian saturation was at 7169 feet.

East of Stephens in Ouachita County, Deep Rock Oil Corporation and Tide Water Associated Oil Company abandoned A. C. Wesson 1, NE SE SE 23-15-19, at 6053 feet after testing a showing of oil with a large amount of salt water when casing was perforated at 5950 feet. Casing had been set at 6038 feet.

Tide Water Associated Oil Company and Seaboard Oil Corporation made location for their second test at Atlanta, Columbia County, new location being Price 1, C NE SW 15-18-19, south offset to Beene 1 in the same section, completed in the Permian lime at the 8200 foot level last December 16.

ARKANSAS Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Columbia (Magnolia)—		
Southwood Oil Corp., J. O. Hutcherson 1, 14-17-20	720	7565
Lawrence (Wildcat)—		
Crenshaw et al, L. Croom 1, 30-15s-2w	*	856
Lafayette (Wildcat)—		
Wadley et al, Taylor 1, 15-19 16...	*	6802
Lonoke (Wildcat)—		
Carlisle Oil Dev. Co., Walthour-Flake 1, 10-1n-7w	*	1745
Miller (Rodessa)—		
Gerhig Co. of Ark., Watson 2, 2-20-28	480	6235
Nevada (Falcon)—		
Texas-Canadian Oil Co., Stocks 3, 9-15-22	*	1204
Ouachita (Stephens)—		
Deep Rock & Tidewater Associated, A. C. Wesson 1, 23-15-19.....	*	6053
Nevada (Troy)—		
Benedum & Trees Oil Co., T. Erby 1, 3-14-20	75	2121

* Failures; † Junked; ¶ Million cu. ft. gas.

Ten permits in Arkansas

El Dorado, Ark.—Ten drilling permits were issued last week by the Arkansas Board of Conservation as follows: Columbia County—Vaughn and Hunt, A. S. Crisp 1, C SE NW 23-17-20; Penrod Drilling Company, Tally 1, 740 S and 660 E of NWc NW SW 14-17-20; LaFayette County—Standard Oil Company of Louisiana, J. P. McKean 5, 660 north and east SWc NW SE 7-16-22; Miller County—Chamblee and Pitts, H. C. Mitchell 2, 990 north and 334 east SWc east half SW SE 2-20-28; Union County—G. E. Snuggs, Sam Sebersky and Dr. Edward Bylick, G. N. Jerry 1, C SE SW 21-17-14; Hollyfield and McFarlane, S. Murphy 7, located 150 feet south and west NEc E half SE NW 9-16-15; Lion Oil Refining Company, Murphy Land Company 1, located 660 east and 330 north SWc NW NE 13-18-18; Murphy 1, located 330 south and west NEc SW SE 13-18-18; Clay 1, located 330 south and west NEc SE SW 12-18-18; and Clay 2, located 330 south and west NEc SW 12-18-18.

Plan another Georgia test near 1938 failure

Jackson, Miss.—Despite a dry hole drilled in 1938 in Pierce County, Georgia, H. H. Weinert of Seguin, Texas, has assembled a block three miles north of the abandoned test, Adams McCaskill 1 (Georgia is unsectionized), for a proposed 5000-foot test. It is reported that Pan American Petroleum Company, Independent Prospecting Company, Donald Clark, and Roland L. Taylor, the latter of Pittsburgh, Pennsylvania, are interested in the proposed test.

Also in Georgia, in Echols County, in the southwest part of the state, H. E. Pollock of Asheville, North Carolina, has assembled a 30,000-acre block centering two miles southwest of the town of Statesville, and extending into Hamilton County, Florida.

In Santa Rosa County, Florida, northeast of Pensacola, Phillips Petroleum Compay has had an area checked with a geophysical unit. In DeSoto County, Florida, Peninsular Oil & Refining Company's block taken in September, 1935, was recently gone over by a gravimeter unit. Clem S. Clarke of Shreveport, Louisiana, who has geophysical option on approximately 1,000,000 acres in Collier and adjacent counties, is taking some additional geophysical options on acreage in townships 43, 44 and 45 south, ranges 25, 26 and 27 east, Lee County, Florida.

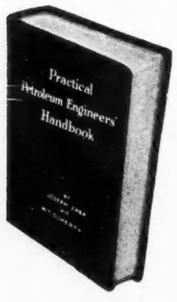
In Barbour County, Alabama, H. A. Stebbinger's Mrs. Alyce Robertson 1, NE NE 19-10n-26e, is drilling and coring shales and sands at 4825 feet.

The Texas Company's producing committee meets

Annual meeting of The Texas Company's producing committee was held in Houston, February 20, 21, and 22. R. Ogarrio, New York, vice president in charge of production, presided. A field trip in the Gulf Coast area followed the meeting.

The company's production men attending were: F. C. Sealey, New York, in charge of foreign production; R. F. Baker of New York; H. A. Stewart, Denver, Colorado; H. N. Pardee, Tulsa; R. C. Stewart, Shreveport; H. S. Cole, Jr., Fort Worth; J. A. Bermingham, Houston; A. C. Hunter, New York; J. T. Wood, Jr., Los Angeles, and E. R. Filley, A. R. Wilson and V. L. Porter, Houston.

PRACTICAL PETROLEUM ENGINEERS' HANDBOOK



By JOSEPH ZABA, E. M. M. Sc.
Petroleum Engineer, Rio Bravo Oil Company
and
W. T. DOHERTY
Division Superintendent, Humble Oil & Refining Company

For a number of years there has been a growing demand for a handbook containing formulae and other practical information for the benefit of the man working in the production and drilling branches of the oil industry. So great has been this need that many engineers have tried to accumulate their own handbooks by clipping tables, formulae and figures from scores of sources.

The co-authors of this volume discovered by coincidence that each had been for a period of several years accumulating practical data which through their collaboration appears in this book. Both of them are men who have not only received theoretical training but who have had many years of practical experience as engineers in dealing with every day oil field drilling and production problems.

As a result of this collaboration of effort the publishers of this volume feel that it is a most valuable contribution to oil trade literature.

Its purposes are distinctly practical. The tables, formulae, and figures shown are practical rather than theoretical in nature. It should save the time of many a busy operator, engineer, superintendent, and foreman.

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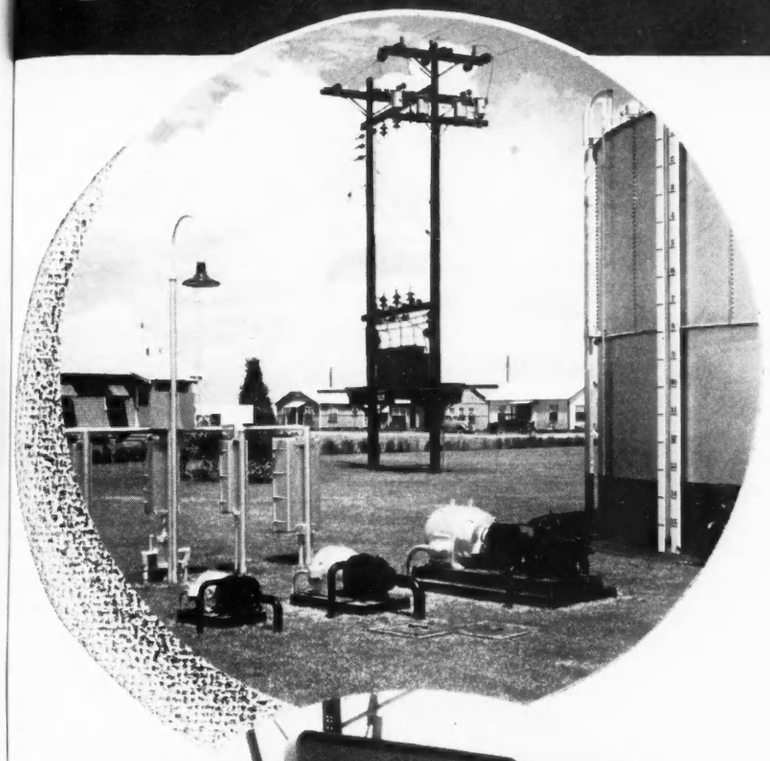

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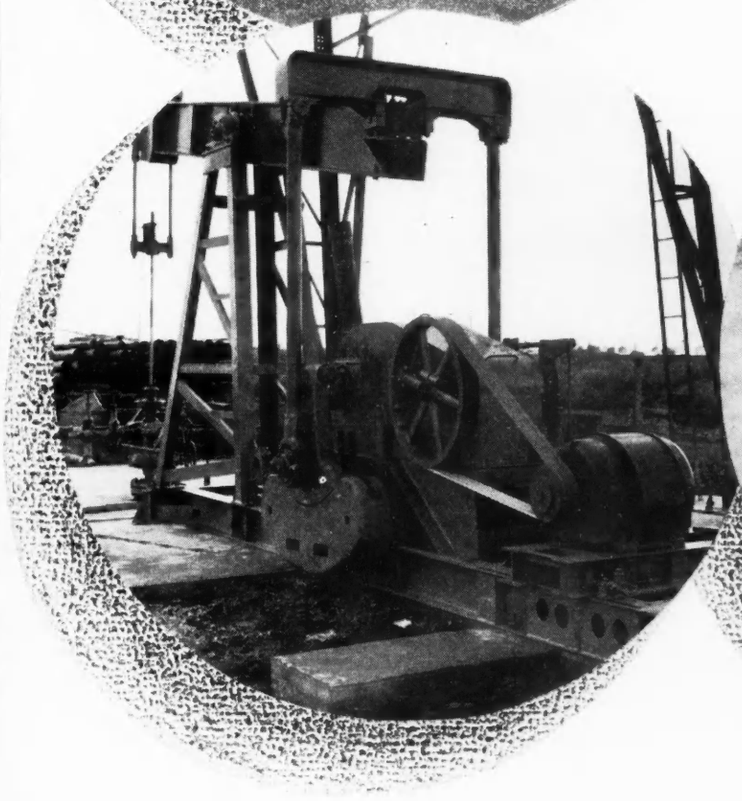
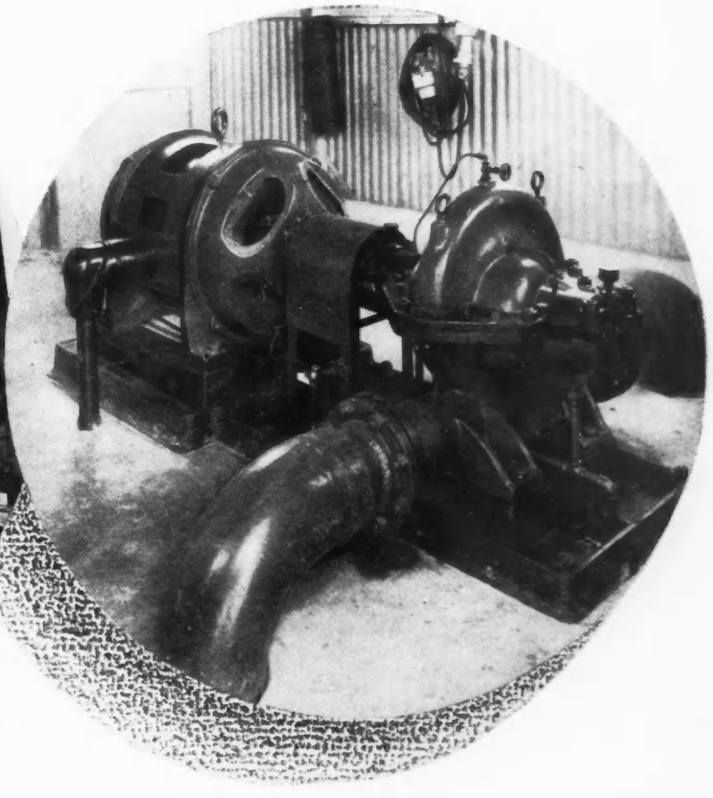




HOUSTON LIGHTING & POWER COMPANY

New Mexico Fields

Second failure completed in Repollo area of Lea County. Nine new operations in Lea County include one wildcat.

Hobbs, New Mexico.—A second failure for the Repollo pool, Lea County, was in prospect last mid-week when Repollo Oil Company's State 2-197, SE NE SE 6-17s-34e, logged only nominal oil saturation in drilling with tools to 4685 feet, or 575 feet sub-sea. The company's State 1-197, half-mile south, established the pool last June with flowing production after acidizing broken pay at 4644-85 feet. It was plugged back from water at 5016 feet. The discovery, which was 4-1/3 miles northwest of the Vacuum area upon completion, is currently producing its allowable quota.

Barnsdall Oil Company's State-Humble 1, C NE SE 33-16s-36e, western outpost for the Lovington pool, failed to encounter water in drilling to 5269 feet, or 1367 feet sub-sea. The test was treated with 3000 gallons of acid, and had a small show of gas when swabbed down to within 700 feet of bottom. It is scheduled to be swabbed dry, then if any free oil appears it will be reacidized. Stanolind Oil & Gas Company's State 2, C SE NW 1-17s-36e, only operation within the pool, logged top of the anhydrite at 1895 feet, with an elevation of 3840 feet, and was drilling at 2880 feet.

Shell Petroleum Corporation's Geo. Harwood 1, located on the Milne sand geophysical prospect, Roosevelt County, and the only active deep project in New Mexico, was drilling lime and anhydrite at 5960 feet. It failed to yield production in the upper portion of the Permian, and is due to be deepened to 8000 feet.

Nine new operations assigned Lea County the past week were divided among 5 fields and a wildcat block. The first wildcat project for the year is Carper and Taylor's Taylor permit 1, SW SW SW 30-16s-32e, near the west border of the county and 2¼ miles northwest of production in the Maljamar pool. Drilling is in progress below the surface pipe.

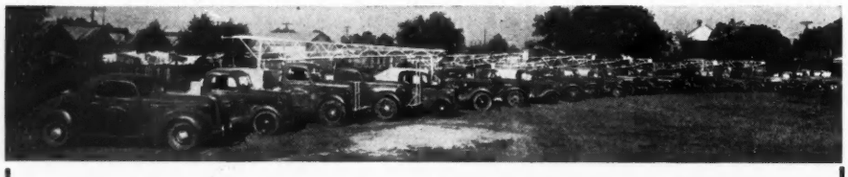
Mid-month hike in the production allowable for the state ordered by the Oil Conservation Commission for the February 16-28 period is to be followed by a major increase in March. The restoration of the export demand for Eddy County output from 3000 to 5000 barrels caused the daily yield for the state to be increased accordingly on February 16 to 104,600 barrels. Prorated wells in Eddy County and those in the Maljamar field were increased from 45 to 65 barrels daily on the above date. However, Lea County's average yield per well was cut back one barrel to 49 barrels daily in order to absorb new completions in the face of a stationary market demand. The commission has announced that the oil allowable for the state will be boosted to 114,700 barrels daily, effective March 1, and this quota will include the 5000-barrel export delivery to Italy.

The prolific lime area situated between the Eunice and Penrose areas but classified as the former for proration purposes registered its sixteenth flowing well through completion of Continental Oil Company et al's Lockhart 4-B-1, C W½ SW NE 1-22s-36e. The well flowed 47 barrels hourly natural through ¾-inch choke from pay at 3742-3800 feet, with an elevation of 3513 feet. Gulf Oil Corporation's Mattern 3-E, C NW NW 12-22s-36e, has started as an offset to a recent south extension.

Continental Oil Company et al's Sanderson 3-B-14, C E½ SE SW 14-20s-36e, west edge of the Monument field, averaged 60 barrels hourly for 3 hours on preliminary test at 3840 feet, or 263 feet sub-sea, through casing with drill pipe swinging. Tubing has been run for completion. Derrick is up for Sanderson 4-B-14, NE SW NW 14-20s-36e. The Texas Company's State-Lieu 16-H, C NE SW 20-20s-37e, near the intersection of the Monument and Eunice fields, used 3000 gallons of acid in lime at 3850 feet, or 323 feet below sea level. The well swabbed 6 barrels of fluid hourly, averaging 15 percent bs&w. The cut oil was believed to be due to the return of the acid load.

Magnolia Petroleum Company's State 2-J, C NW SE 22-7s-34e, situated on the northwest edge of the main portion of the Vacuum field, swabbed 6 barrels of oil hourly after using 1500 gallons of acid at 4740 feet. The well responded to treatment with 3000 gallons of acid with a steady flow. Rig has been moved to drill State 3-J, C SE NE 22-17s-34e.

Two leases in the Langlie sandy-lime area are in line to receive their initial development. Anderson-Prichard Oil Corporation's Woolworth 1, NW NE NE 17-25s-37e, is a location, and derrick is up for the Italo Petroleum Corporation's Indian Petroleum 1-B-4, NE NW NW 4-25s-37e. In the Mattix area, Phillips Petroleum Company and Pure Oil Company's Woolworth 6, C NE NE 33-24s-37e, missed the regular oil saturation, and was awaiting swabbing test through tubing at 3539 feet. Humble Oil & Refining Company's Williams 4, an east offset, has rigged up rotary. Schermerhorn Oil Company's Woolworth 6, C SW SE 28-24s-37e, has moved in tools.



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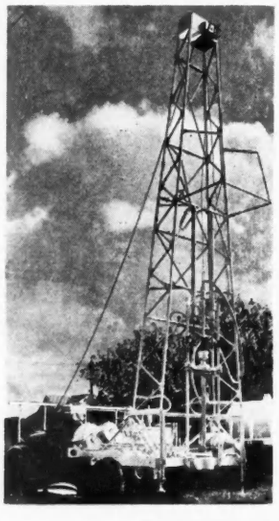

NEW MEXICO Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Eddy County—		
Martin Yates et al, Yates 1, c nw sw 6-18s-30e	550	2874
Lea County (Eunice)—		
Continental et al, Lockhart 4-B-1, c w½ sw ne 1-22s-36e	1128	3800
Lea County (Maljamar)—		
Maljamar O&C Corp., Mitchell 6, c sw ne 20-17s-32e	75	4038
State 1-B, c sw se 16-17s-32e	25	4125
Lea County (Mattix)—		
Walter Donnelly et al, Davis-Shell 1, c se sw 33-23s-37e	10	3600
North Shore Corp., Woolworth 1, ne ne nw 33-24s-37e	1080	3548
Woolworth 2, se se nw 33-24s-37e	1680	3534
Parker Drl. Co., Erwin-Texas Co. 3, c w½ ne sw 35-24s-37e	40	3460
Schermerhorn Oil Corp., Woolworth 4, c ne se 28-24s-37e	218	3530
Lea County (Vacuum)—		
Continental, State 1-H-34, c se se 34-17s-34e	888	4675
State 4-H-35, c se nw 35-17s-34e	135	4710

* Failures; † Junked; ¶ Million cu. ft. gas.

Rocky Mountain States

Eastern limits of Leo found at Lance Creek

Casper, Wyo. — Eastern productive limits of the Leo sand in the Lance Creek field, Niobrara County, were established this week by Ohio Oil Company's Leo 1 OPC-7NWc SE 35-36n-65w, eastern outpost well in the field, which found 11 barrels of water on test after deepening to 5763 feet in the lower benches of the Minnelusa sand. Hole is plugging back to test in the Sundance. The company's other active well, Agnes Rohlff 5, NW NE SW 32-36n-65w, is drilling below 2587 feet.

A new southern extension test of the proved area of Lance Creek, Minnelusa Oil Corporation's H. & M. 1 on Lease 5, NW NE SE 7-35n-65w, south offset to the southernmost producing well in the field, is running rig.

Operators are preparing to deepen Continental Oil Company's Tom Bell 14, CNW SW 34-36n-65w, from 3941 feet after it swabbed only a nominal amount of oil from the Basal Sundance sand at this depth. The company's new test on the northwest edge of the field, Emil Rohlff 2, NW SE NW 32-36n-65w, is rigging up and will spud this week.

Joint test of Adams Oil & Gas Company and Felmont Oil Corporation Baker 1, NW NE SW 8-35n-65w, on the southern edge of the producing limits of the field, is preparing to go on pump after it showed no material increase in production after a 24-quart shot of nitroglycerine at 5636 feet. It swabbed 80 barrels daily before shooting.

Minnelusa Oil Corporation's Joss 2, SEc NE SW 6-35n-65w, on the western side of the field, is rigging rotary to deepen from 3983 feet in the Sundance sand for recompletion in the Leo horizon. This well originally completed in 1937 for a marginal well in the Jurassic formations and will serve as a check for western limits on Pennsylvania production.

Northwest extension test of the Dewey Dome field, in Weston County, northeastern Wyoming, proved a disappointment this week when T. R. Ragland and Osage Trust Company's Government 1, CEL NW SW 31-42n-60w, swabbed dry after deepening to 2535 feet. It reported some oil shows in shale beds at around 2501 feet. Hole is being abandoned and location will be moved east and north for another test.

No saturation is reported as yet in the Morrison formations of the Cole Creek structure, where General Petroleum Corporation's deep test, State 2, NW NE SE 16-35n-77w, is drilling and coring at 8357 feet in sand horizon of the Cretaceous-Jurassic transitionary beds. Principal objective is the Sundance sand which is expected around 8500 to 8750 feet.

Recent start in the Big Hollow field, Albany County, southern Wyoming, is G. R. McConnell's Thomas 2, CNL NE NW 7-15n-75w, which has cemented 10-inch surface casing at 163 feet and is drilling ahead below 311 feet. This is the second well to drill in the field, the discovery well being same operators' Thomas 1, which completed in November, 1938, for 25 barrels initial on pump from 920 feet in the Harris sand.

Gas sand at 2232 feet has been cemented off in Mountain Fuel Supply Company's Florence Wilson 1, NW SE NE 22-12n-100w, discovery well in the Hiawatha oil and gas field, in Moffat County, northwestern Colorado, and operators are waiting on cement to set before drilling ahead to test for oil possibilities in the lower Wasatch sands of the structure.

MOUNTAIN STATES
Completions

MONTANA

Company, Well and Location	Init. Prod. Bbls.	Depth
Glacier County (Cut Bank Field)—		
Glacier Production Co., O'Brien 3, csw sw 32-34n-5w	145	2695
Santa Rita Oil & Gas Co., Lander 3, cs se 15-35n-2w	30	2937
Nadeau Brothers, Crowley-Government 1, ne sw ne 25-37n-5w	*	2747
Toole County (Kevin-Sunburst Field)—		
Big West Oil Co., Gunderson 9, nw se nw 19-35n-2w	168	1654
Kluth et al, Gunderson 2, sw sw sw 18-35n-2w	30	1675
Superior Petroleum Corp., Government 11, e nw sw 12-35n-3w	22	1493

WYOMING

Niobrara County (Lance Creek Field)—		
Continental Oil Co., Apex-4 3, se sw nw 35-36n-65w	2390	5478
Ohio Oil Co., Leo-6 OPC-16, nw ne sw 35-36n-65w	2240	5576

*Failures; †Junked; ¶Million cu. ft. gas.

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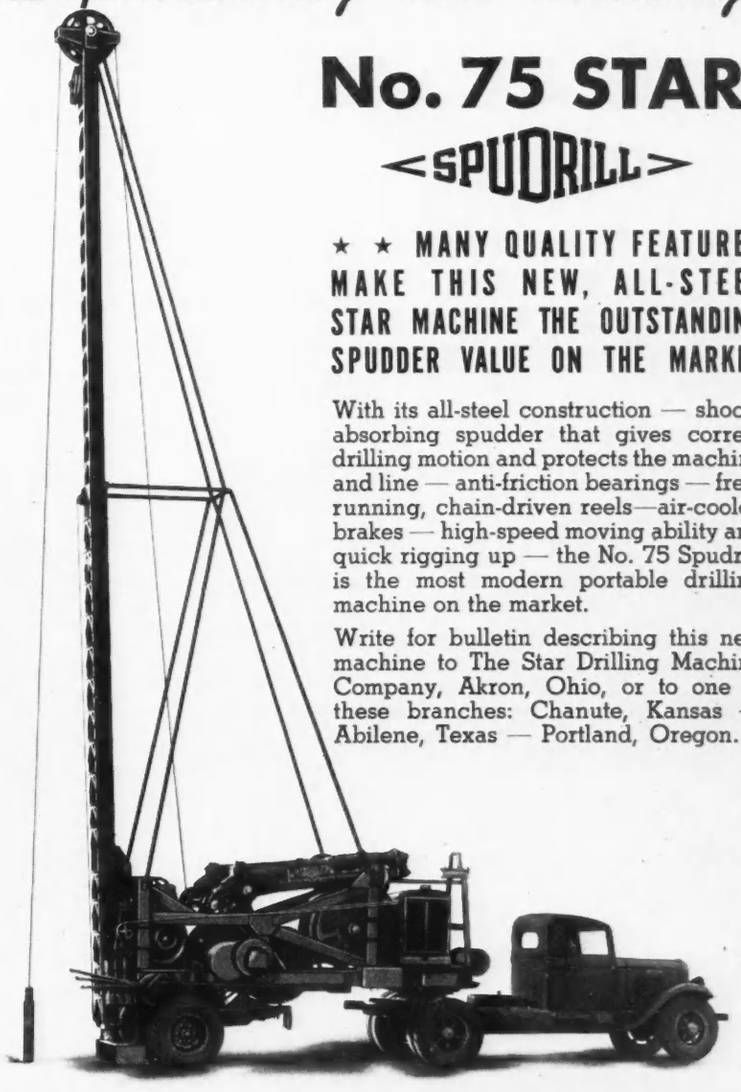

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California Fields

Area in Santa Barbara County drawing wildcatters. Continental sets 12,020 feet of casing at Wasco.

Los Angeles.—Standard Oil Company's Jewett 1, NEc 16-31-29, Arvin, Kern County, is credited with the discovery of a new field described as an accumulation against the Bear Mountain fault although the productive zone is similar to that found in the Mountain View field a few miles to the north. The well was completed for an initial yield of 500 barrels of 31-gravity oil per day and increased to 1200 barrels daily, from 6274 feet. It is a joint test, Superior Oil Company and The Texas Company being interested.

Union Oil Company cleaned up a fishing job in Calkins 1 in the West Montebello extension late last week and swabbed it in for 1600 barrels of 34.8-gravity oil per day from 6688 feet. This well extended the Masser producing area to the northeast.

Hogan Petroleum Company is launching a wildcat test a short distance from Lompoc. In Section 12-7-31, General Petroleum Corporation will soon start Chamberlain 1, in the Foxen Canyon area. Still a third project will get under way shortly in Section 32-8-32, south of Los Alamos, where Richard Bailey and J. J. Baker and several associates will drill Roblar 1. The Hancock-Petroleum Securities combination drilled a duster near the Roblar 1 location several years ago.

Continental Oil Company last week set 12,020 feet of 7-inch casing in KCL A-4, in the Wasco field, after bottoming at 12,613 feet and now is drilling ahead with the intention of carrying this project to 13,200 feet before attempting a production test. The casing was set about 500 feet lower in the formation than in previous tests. KCL A-4, which is southeast from the operator's discovery well, is correlating right along with the first wells at Wasco. Standard Oil Company's Mushrush 2 which is going down in Section 7-27-24, the same section where Mushrush 1 was completed, is an outpost project, and last week was drilling below 12,000 feet in brown shale.

A change in the formation being penetrated in the Petrol Corporation's Reserve-Petrol 33-5, deep test in Section 33-11-19, in the Grapevine-Wheeler Ridge area of Kern County, was indicated last week. A core taken from 8492 to 8503 feet revealed a change in formation from volcanic-basalt to hard brown shale. This project was coring in hard shale below 8600 feet with faint showings of gas. Temblor was topped at 8500 feet after penetrating 1700 feet of basalt. Tide Water Associated Oil Company's S. P. 2, wildcat, Section 15-11-19, in this same district, is fishing with bottom at 7326 feet after swabbing salt water with a scum of oil earlier in the week.

In the Ten Section field, Kern County, Shell Oil Company completed KCL B-6-30, in Section 30-30-26, for an initial yield of 3580 barrels of 33.6-gravity oil per day from 8200 feet. The company has spudded KCL A24-30. In the Canal field, Shell's KCL B-87-4, in Section 4-30-25, is nearing the critical stage as it is coring in sand and shale below 11,800 feet. In a nearby section, Ohio Oil Company's E-10, which bottomed at 8485 feet and plugged to 8320 feet, with 7-inch cemented at 8112 feet, was cleaned out and a new liner run.

CALIFORNIA
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Los Angeles County—		
Olympic Ref. Co., Smith Comm. 1, 50 ft s and 170 ft w of swc Maple and Victoria	840	7137
Texas Co., Oakley 3, 400 ft e and 260 ft s at R/A from C/Ls Lomita Blvd. and Dodge Ave.	228	5188
Alford Oil Co., No. 12, 214 ft n and 58 ft e of C/Ls 238th St. and Eshelman	1040	5179
Anderson et al, Grant 1, 128 ft s and 108 ft e of C/Ls 237th St. and Eshelman	540	5170
Cuba Oil Co., No. 1, 50 ft s and 80 ft e of sec of 236th St. and Eshelman	595	5145
Felix Mallon, Mallon 5, 61 ft n and 468 ft e of C/Ls 237th St. and Eshelman	1350	5165
George F. Getty, "W"-3, 238 ft s and 160 ft w from C/Ls Sanford Ave. and "F" St.	97	5690
Richfield, Pacific Dock (LB) 23, 1488 ft s and 535 ft w at R/A from ne lease cor.	408	3013
Union Pacific, U.P. (LB) E-13, 1592 ft s on C/L Henry Ford Ave. from C/L Anaheim; thence 4826 ft e at R/A	260	2999
Orange County—		
Southwest Explo. Co., State 7, 126 ft n and 2488 ft w of C/Ls of 23rd St. and Ocean, parallel and perp. to C/L Ocean	360	4315
Kern County—		
Shell, KCL A-71-14, 329 ft s and 1640 ft w of nec of sec 14-30-25	1170	8340
California Western Oil Co., KCL 1, 330 ft n and 330 ft e of w¼c sec 14-29-27	*	3520
Fresno County—		
MCA Dr. Co., Kreyenhagen 1, 400 ft s and 900 ft e of nwc sec 33-22-16 (W)	*	2022
Ventura County—		
Tide Water, Lloyd 135, 1020 ft s and 530 ft e of C.L. No. 11	1197	9838
Crystal Oil Co., Crystal 1, 500 ft n and 300 ft e of swc nw¼ of se¼ sec 35-5-20 (W)	*	250
Santa Barbara County—		
Hogan Pet. Co., Zabala Core Hole 1, 900 ft n and 2730 ft w of sec of sec 33-9-34	*	1205

* Failures; † Junked; ¶ Million cu. ft. gas.

Michigan Fields

Four new fields loom for southwest part of state. Traverse lime saturation responsible for showings.

Mount Pleasant, Mich.—Four new fields in the southwestern part of the state appeared likely this week, with one wildcat producing from a new record shallow depth of 1010 feet. Seven pools were discovered in Allegan and Van Buren counties in 1938 and one in Kent County. So far this year seven wildcat tests have produced commercially in the southwestern counties to emphasize this district as the probable area of major concentration in 1939.

Detroit-Allegan Development Company's Allegan County Farm 1, NW SW SE, Section 5-2n-13w, this week topped Traverse lime at 1549 feet, had oil saturation at 1554 feet and bottomed to test at 1569½ feet. Bailer tests showed 110 feet of oil and the operators ordered a 500-gallon acid treatment. The wildcat is 4 miles north of Allegan.

Expected to open an entirely new play is Blood & Hendershott's Jackson 1, NE NE NE, Section 29-2s-16w, Bangor Township, Van Buren County, 10 miles southwest of the Columbia pool, which flowed and swabbed 160 barrels natural at 1010½ feet from Traverse limestone.

Blood & Hendershott have an interest in the 300-acre drilling block, while Scheley & Bowman, of Goshen, Indiana, who worked up the play, control a 2700-acre spread. The well is in the heart of the Michigan grape and peach orchard country.

Drilling log of the test showed 248 feet of 8-inch drive pipe with a dry hole to the top of the Traverse lime, where 6-inch casing was set at 1003 feet.

Commercial production was established by Bridger Basin Oil Corporation on the Norton 1, NE NW NW, Section 30-1n-12w, Allegan County, 4 miles due east of the Throwbridge pool. Bridger's well is producing from 15 to

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150 sections,	96,000 acres.....	96,000.00
83 sections,	53,420 acres.....	31,810.00
58 sections,	37,340 acres.....	19,030.00
51 sections,	32,880 acres.....	55,000.00
42 sections,	27,040 acres.....	32,500.00
29 sections,	19,160 acres.....	29,400.00
18 sections,	11,520 acres.....	25,000.00
17 sections,	11,250 acres.....	17,500.00
15 sections,	9,640 acres.....	25,000.00
15 sections,	9,480 acres.....	21,000.00

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20 barrels on the pump, after acid, at 1489 feet, 3 feet in Traverse lime.

Clapsaddle & Harris' Been 1, NW NW NE, Section 24-1s-15w, Columbia Township, Van Buren County, 2 miles southeast of the Columbia pool, showed a hole full of oil at 1160 feet, at the Traverse lime contact, before a producing casing string had been set. The test was shut down for casing cement to set the first of the week.

Sprenger Brothers' Schafer 1, NE NE SW, Section 14-3n-13w, Monterey Township, Allegan County, 2 miles east of the old Monterey pool, is pumping between 10 and 15 barrels of oil from Traverse at 1751 feet. Operators planned to acidize.

In Berrien County, where Sprenger Brothers logged an oil show in Trenton lime at 2268 feet three weeks ago, further drilling failed to show commercial oil in this horizon and operators are now drilling ahead at 2890 feet for a St. Peters sand test.

Of 210 operations in Michigan this week, including locations, drilling and shut down rigs, 69 were in Van Buren County; 35 in Allegan County.

Gulf Refining Company continued to clean out on Bateson 1, Section 2-14n-4e, Bay County, Monroe lime test, where a bailer was jammed two weeks ago as a 290-quart nitro shot was prematurely exploded. The well is swabbing around 100 barrels per day from the Monroe pay at 3530-50 feet.

Lupher Drilling Company is junking the Wilce 1, Section 34-28n-14w, Leelanau County wildcat in northwestern Michigan, at 3003 feet after drilling out the upper Salina salt beds.

MICHIGAN Completions

Company, Well and Location	Init. Prod. Bbls.	Depth.
Allegan County—		
V. Leonard, Crane 1, ne ne ne 1-2n-16w	*	1400
Smith Pet. Co., Laraway 1, nw ne ne 7-2n-11w	*	1799
Bridger Basin, Norton 1, ne nw nw 30-1n-12w	20	1489
Socony Vacuum, Norgaard 1, sw sw sw 2-4n-13w	315	1615
Gordon & Victory, Miller 1, ne ne ne 10-4n-13w	945	1622
Daily Crude Oil Co., Weber 1, nw sw nw 11-4n-13w	*	1660
Petroleum Enterprises, Harig 1, nw nw ne 22-4n-13w	225	1572
R. B. Tamblyn, Gilmore 1, se se sw 36-2n-12w	*	1660
Clare County—		
Turner Pet. Co., Wheeler 1, se ne nw 34-19n-6w	2000	3905
Emmet County—		
Emmet-Cheboygan, McPhee 1, se se se 15-35n-4w	*	1200
Ingham County—		
Darke Brothers, O'Sullivan 1, ne se nw 28-2n-1w	*	2521
Kent County—		
Smith Pet. Co., Whalen 2, se se sw 32-7n-12w	400	1920
Leelanau County—		
Lupher Dr. Co., Wilce 1, sw sw nw 34-28n-14w	*	3003
Ottawa County—		
Redman Oil Co., Tate 1, ne sw sw 16-6n-13w	*	1782
Chas. Rycenga, Knoll 1, nw ne ne 13-8n-16w	*	1815
Van Buren County—		
W. J. Soverign, State Bank 1, ne nw sw 11-2s-16w	*	1240
F. P. Hurt, Heasley 2, ne ne se 7-1s-14w	40	1226
J. W. McIntosh, Klapp 1, se ne sw 8-1s-14w	300	1223
Wiser Oil Co., Boyers 5, se se nw 17-1s-14w	*	1239
R. T. and E., Clinkenbeard 1, ne nw nw 17-1s-14w	3000	1216
Wright & Millers, McConnell 1, se nw ne 6-3s-16w	*	1038

* Failures; † Junked; ¶ Million cu. ft. gas.

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C-24	3	5"	4½"	12"	2⅛"	7.50
C-15	3	5¼"	4½"	12"	2⅛"	7.80
C-17	3	6¼"	4¼"	12"	2⅛"	8.25
C-00	3	6¼"	5"	12"	3½"	8.50
C-01	3	7½"	6"	12"	3½"	9.00
C-02	3	8½"	6"	12"	3½"	10.00
C-03	3	9½"	6"	12"	3½"	12.00
C-04	3	10½"	6"	12"	3½"	13.50
C-05	3	10½"	7½"	12"	3½"	15.50
C-06	3	11½"	7½"	12"	3½"	19.50

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WILDCAT REPORT
New Starts and Completions

STATE	WILDCATS STARTED		WILDCAT TESTS COMPLETED							
			Total		Oil		Gas		Dry	
	This Week	This Year	This Week	This Year	This Week	This Year	This Week	This Year	This Week	This Year
Alabama	...	1	...	1	...	...	...	...	...	1
Arkansas	2	4	4	4	...	...	...	...	4	4
California	4	43	3	18	...	7	...	...	3	11
Illinois	13	68	5	28	...	3	...	...	5	25
Indiana	...	5	...	...	...	...	...	...	...	...
Kansas	3	26	5	25	1	8	...	...	4	17
Kentucky	...	1	1	3	1	2	...	...	...	1
Louisiana	2	20	1	16	1	4	...	...	...	12
North Louisiana	...	7	1	6	1	1	...	...	...	5
South Louisiana	2	13	...	10	...	3	...	...	...	7
Michigan	2	31	10	49	1	3	...	...	9	46
Mississippi	...	1	...	...	...	...	...	...	...	1
Missouri	1	...	...	...	...	...	...	...	...	...
New Mexico	3	4	...	1	...	1	...	...	...	...
New York	...	...	...	2	...	...	...	1	...	1
Oklahoma	2	27	5	26	...	3	...	1	5	22
Ohio	...	...	1	3	...	1	...	...	1	2
South Dakota	...	1	...	...	...	...	...	...	...	...
Texas	16	148	21	146	4	17	...	1	17	128
East Texas	4	16	...	9	...	...	...	...	...	9
North Texas	...	10	6	35	2	9	...	1	4	25
Gulf Coast	1	19	...	11	...	1	...	...	...	10
Panhandle	1	2	...	1	...	...	...	...	...	1
South Texas	8	66	8	65	1	6	...	...	7	59
West Texas	2	35	7	25	1	1	...	...	6	24
Wyoming	1	...	...	...	...	...	...	...	...	...
Total U. S.	49	381	46	313	8	49	...	3	38	261

ARKANSAS

FIRST REPORTS

Columbia County—Tidewater Associated and Seaboard Oil Co.'s Price 1, c ne sw 15-18-19, moving in materials.

White County—G. F. Holden et al's M. P. Wells 1, c sw 36-9n-8w, rigging.

COMPLETIONS

Lawrence County—Gordon Crenshaw et al's L. Croom 1, c se 30-15s-2w, abnd 856 ft.

Lonoke County—Carlisle Oil Dev. Co.'s Walthour-Flake 1, 1283 ft s and 345 ft e nwc 10-1n-7w, abnd 1745 ft.

LaFayette County—J. K. Wadley et al's G. W. Taylor 1, c ne sw 15-19-26, elev 213 ft, top Hill sand (Glen Rose) 5856 ft, top Gloyd 5989 ft, porosity 6070-75 ft, Dees with sw 6115-18 ft (tight); top Young 6155 ft, sw, abnd 6802 ft.

Ouachita County—Deep Rock and Tidewater Associated's A. C. Wesson 1, ne se se 23-15-19, elev 249 ft, top Travis Peak 3235 ft, top Buckner 5693 ft, top Smackover lime 5930 ft, top porous lime 5935 ft, sw abnd 6053 ft.

CALIFORNIA

FIRST REPORTS

Los Angeles County—Coast Consolidated Oil Co.'s No. 1, near nec of polo field, Dana Point, sec ?-8s-8w, lcn.

Ventura Avenue County—Shomy Oil Co.'s Shomy 1, 200 ft n and 550 ft w of sec of sec 32-4-19, elev 750 ft, dr 20 ft.

Santa Barbara County — Hogan Petroleum Co.'s Zabala Core Hole 2, 500 ft n of No. 1 in sec 33-9-34, dr 575 ft sand and shale. J. J. Baker & Assoc.'s El Robla 1, 9140 ft s and 2640 ft e of nec sec 32-8-32, lcn.

COMPLETIONS

Fresno County—MCA Drilling Co.'s Kreyenhagen 1, 400 ft s and 900 ft e of nwc sec 33-22-16, elev 1366 ft, top Temblor 1550 ft (wet), abnd gray sand 2022 ft.

Ventura County—Crystal Oil Co.'s Crystal 1, 500 ft n and 300 ft e of swc of nw¼ of se¼ of sec 35-5-20, abnd 250 ft.

Santa Barbara County—Hogan Petroleum Co.'s Zabala Core Hole 1, 900 ft n and 2730 ft w of sec of sec 33-9-34, abnd in Sisquoc 1205 ft.

ILLINOIS

FIRST REPORTS

Crawford County—H. R. Snavey's L. Mann 1, nw ne 18-7n-12w, rig.

Jasper County—Bur-Kan Petroleum Co.'s J. Harrison 1, sw sw 2-7n-10e, 2 mi west and 1 mi north of Hunt City, moving in materials.

Montgomery County — Southern & Petty's Sawyer 1, ne se ne 15-8n-4w, Hillsboro tnp, sp.

Perry County—H. B. Warren Jr.'s Winkle Estate 1, sw sw sw 19-4s-3w, Beaucoup tnp, moving in materials.

Randolph County—R. T. Pendergast's Beatie 1, nw nw nw 14-5s-5w, dk.

St. Clair County — Charles Wise et al's Schondy 1, 34-1n-10w, Sugar Leaf tnp, dr.

Wabash County—R. S. Hayes' Anna Schultz 1, se nw sw 7-3s-13w, Compton tnp, dr.

Washington County—A. J. Moulton's J. L. Dennis 1, sw ne ne 14-3s-3w, Pilot Knob tnp, loc. Pres Cochrane's Blankenship 1, se se sw 15-3s-3w, Pilot Knob tnp, moving in materials. Pitfer et al's Hofer 1, se sw sw 22-1s-1w, dr.

Wayne County—G. A. Manahan's J. H. Fitch 1, c n sw se 3-1n-8e, Elm River tnp, moving in materials. Pure Oil Co.'s F. Behymer 1, c w se ne 4-1n-8e, Elm River tnp, dr. G. A. Manahan's E. Fitch 1, c n se ne 10-1n-8e, Elm River tnp, loc. New Penn Development Co.'s B. O. Scott 1, nw se 7-20-9e, loc.

COMPLETIONS

Clinton County—Adams Oil & Gas Co.'s Hoffman Heirs 1, c nw se sw 26-2n-1w, Meridian tnp, abnd 1437 ft.

Sangamon County—Morris et al's King 1, nw ne se 24-15n-7w, top Devonian 1335 ft, top Trenton 1806 ft, abnd 2257 ft.

Tazewell County—Hopedale Oil & Gas Co.'s Litwiller 1, nw sw sw 2-22n-3w, Boynton tnp, top St. Peter 2139 ft, abnd 2310 ft.

Wabash County—Taylor Drilling Co.'s Schafer 1, sw sw se 28-1n-12w, Wabash tnp, top McClosky 2339 ft, abnd 2348 ft, drill stem test showed 100 ft of oil and 300 ft of water in hole.

Wayne County—Dr. Moore, Moore 1, c se ne nw 16-3s-5e, Four Mile tnp, top Benoist 3015 ft, top St. Genevieve 3190 ft, top Fredonia 3250 ft, abnd 3402 ft.

KANSAS

FIRST REPORTS

Butler County—Hall, Hay & Table-Mesa Oil Co.'s Ferrell Ranch 1, sw nw ne 28-28-8e, dr.

Cowley County—Meade Bros.' Julian 1, ne se nw 16-33-3e, dr.

Russell County—Skelly Oil Co.'s Carter 1, c sl sw ne 33-14-13w, pits.

COMPLETIONS

Barton County — Sinclair-Prairie Oil Co.'s Pichner 1, ne se se 10-16-11w, 1 mi se of Davidson pool, top Topeka 2615 ft, top Lansing 3010 ft, base Kansas City 3290 ft, top Arbuckle 3344 ft, td 3371 ft, pb 3245 ft, perf 28 shots 3109-28 ft, abnd. Amerada Petroleum Corp.'s Kruckenberg 1, c ne ne 14-19-15w, 4½ mi w of Heizer pool, top Lansing 3260 ft, base Kansas City 3533 ft, top Arbuckle 3572 ft, acidized with 3000 gals, td 3632 ft, completed, 132 bbls, gr 32.7.

Butler County—Higgins & Pierce's Shrieves 1-A, ne nw se 22-26-4e, 1 mi s of Towanda, td 1000 ft, abnd.

Cowley County—Brewer & Blair's Miller 1, ne nw ne 13-32-5e, 3 mi e of Tisdale gas pool, top Stalnaker 1900 ft, top Bartlesville 2925 ft, top Mississippi 3068 ft, abnd.

Kingman County—Duwe & Farris et al's Kimminau 1, ne sw sw 12-30-9w, 1½ mi e Zenda, top Topeka 3018 ft, top Lansing 3587 ft, top Chat 4265 ft, top Kinderhood 4475 ft, top Viola 4577 ft, top Simpson sand 4635 ft, top Simpson shale 4691 ft, top Arbuckle lime 4758 ft, so&sg 4768 ft, abnd 4799 ft.

KENTUCKY

COMPLETIONS

Henderson County—Sun Oil Co. & Kentucky Natural Gas Co.'s G. Trigg 2, 8 mi southwest of Henderson, 2 mi north of Corydon, started flowing natural at 8 bbls an hour from McClosky, td 2605 ft. It is 12 mi from nearest production.

NORTH LOUISIANA

COMPLETIONS

Webster Parish—Magnolia Pet. Co.'s H. M. Branton 4, c ne 6-22n-9w, elev 227 ft, massive anhydrite 4401-4436 ft, top Travis Peak 5780 ft, top Cotton Valley 7750 ft, completed 150 bbls 62 grav. distillate and 2 mil ft gas daily, td 9203 ft. (Second deep well for Shongaloo district).

SOUTH LOUISIANA

FIRST REPORTS

Cameron Parish—Superior's State 1, Grand Lake area, 5650 ft w and 8500 ft n of nec section 24-13s-4w, lcn.

Iberville Parish—Humble's Iberville Mortgage Loan Company 1, Rosedale area, 800 ft from nw line and 1600 ft fr sw line of section 74-7s-10e, bldg roads.

MICHIGAN

FIRST REPORTS

Calhoun County—Mar-Cal Development Co.'s Woods 1, sw sw se 13-2s-6w, dr.

Isabella County—Socony Vacuum Oil Co.'s Snyder 1, se nw 23-13n-5w, rig.

COMPLETIONS

Allegan County—V. Leonard's Crane 1, ne ne ne 1-2n-16w, Ganges township, abnd in Traverse 1400 ft. Smith Petroleum Co.'s Laraway 1, nw ne ne 7-2n-11w, Martin township, top Traverse lime 1655 ft, so 1666 ft, water 1688, abnd 1799 ft. Bridger Basin Oil Corp.'s Norton 1, ne nw nw 30-1n-12w, Otsego township, top Traverse lime 1487 ft, so 1488 ft, td 1489 ft, after acid initial 15 barrels. R. B. Tamblyn's Gilmore 1, se se sw 36-2n-12w, Watson township, abnd 1660 ft.

Emmet County—Emmet & Cheboygan's McPhee 1, se se se 15-35n-4w, temporarily abnd 1200 ft.

Ingham County—Darke Brothers' O'Sullivan 1, ne se nw 28-2n-1w, temporarily abnd 2521 ft.

Leelanau County—Lupher Dr. Co.'s Wilce 1, sw sw nw 34-28n-14w, Empire township, abnd in Salina salt, 3003 ft.

Ottawa County—Redman Oil Co.'s Tate 1, ne sw sw 16-6n-13w, abnd 1782 ft in Traverse. Charles Rycenga's Knoll 1, nw ne ne 13-8n-16w, abnd in Traverse, 1815 ft.

Van Buren County—W. J. Soverign's State Bank 1, ne nw sw 11-2s-16w, abnd in Traverse lime, 1240 ft. Wright & Millers' McConnell 1, se nw ne 6-3s-16w, abnd 1038 ft.

MISSOURI

FIRST REPORTS

Macon County—C. E. Richardson et al's T. Jones 1, c nw nw 16-58n-17w, moving in materials.

NEW MEXICO

FIRST REPORTS

Chaves County — New, Russell & Wood's Sterrett 1, nw se nw 29-11s-25e, mim. Tarkenton Bros. et al's Frank Peters 1, near se se se 33-11s-25e, rur.

Lea County—Carper & Taylor's Taylor 1, sw sw sw 30-16s-32e, dr 310 ft.

OKLAHOMA

FIRST REPORTS

Comanche County—Mid Night Oil Co.'s Howe 1, nwc ne 20-2n-13w, otd 703 ft, fsg 746 ft. Parsons' Stephens 1, c nw sw 29-4n-9w, dr.

Garvin County—Ker-Lyn Oil Co.'s Butterly 1, nec se 22-1n-1e, otd 3705 ft, to deepen.

COMPLETIONS

Cleveland County—Burke-Greis' Alberts 1, se sw nw 19-7n-1w, 2 mi se of Bale, top Pawhuska 3740 ft, top Tonkawa 4540 ft, top Checkerboard 5508 ft, top Woodford 6830 ft, top Hunton 6885 ft, top Sylvan 7180 ft, top Viola 7320½ ft, top Dense 7390 ft, top Second Wilcox 7710 ft, abnd 7735 ft.

Hughes County—Doup et al's Bond 1, nec sw 7-7n-9e, n of city of Holdenville, top Booch 2770 ft, abnd 3098 ft.

Okmulgee County—Jim Wise Drilling Co.'s Morrow 1, sw nw ne 16-15n-13e, Natura District, top Booch 1615 ft, top Dutcher 1919 ft, abnd 2657 ft.

Pontotoc County—Lee's Weatherly 1, nw se nw 24-1n-7e, top Hunton 484 ft, abnd 700 ft. Moore's Payne 1, se nw se 16-4n-4e, 3 mi sw Beebe pool, abnd 997 ft.

OHIO

COMPLETIONS

Lawrence County—Meigs Development Co.'s E. S. Culbertson 1, Section 10, Elizabeth tnp, top Big Lime 1970 ft, top Medina 2750 ft, abnd 3000 ft.

EAST TEXAS

COMPLETIONS

Freestone County—A. J. Willis et al's Freedman Bros. 1, 330 ft fr e line of tract and A. Careo sur No. 120 and 330 ft fr s line of tract and creek, 3½ miles nw Stewards Mill, elev 300 ft, top Pecan chalk 1980 ft, Austin chalk 2860-3326 ft, top Woodbine series 3620 ft, abnd 4000 ft.

Houston County—Cooke & John Mayo's C. A. Walling-Shell 1, 1550 ft fr n line of tract and B. Parker sur and 376 ft w of railroad and 1600 ft fr e line of 213-ac tract, 4 mi n Grapeland, elev 501 ft, Pecan chalk 4647-4877 ft, Austin chalk 5657-5962 ft, top Woodbine series 6067 ft, top sand 6075 ft, abnd 6118 ft.

McLennan County—Carmox Oil Co.'s Swift 1, abnd 2489 ft. R. E. Lynch & A. T. Culbertson's A. B. Lucas 1, 180 ft fr se and 2050 ft fr ne lines lse, G. Gibbens sur, abnd in w.s. 886-898 ft. Russell & Gerdes' Trippett 1, 150 ft fr se and 300 ft fr sw lines of 125-acre tract, BBB&C sur, base Austin chalk 351 ft, top Buda 302 ft, top Georgetown 379 ft, abnd 480 ft.

TEXAS PANHANDLE

FIRST REPORTS

Wheeler County—Smith Bros. Ref. Co., Inc.'s J. K. Ribble 1, ne ne se H&GN sec 46, blk A-5, mim.

WEST TEXAS

FIRST REPORTS

Howard County—Dick Graham et al's Pete Johnson-Skelly 1, 330 ft out of nec T&P sec 34, blk 32, T-1-N, lcn.

Jones County—Groover-Rose et al's Mrs. Ida Crow 1, 440 ft out of sec sec 9, Deaf & Dumb Asylum Lands, mim.

COMPLETIONS

Coke County—Barnett Pet. Corp.'s J. R. Mims 1, 330 ft out of sec T&P sec 39, blk W, elev 2352 ft, used acid in saturated lime 1805-61 ft, abnd.

Concho County—A. J. Hennings et al's A. E. Jones 1, 1000 ft fr n and 330 ft fr w lines of 300-ac tract, sec 1879, J. G. Rey-E. D. Miller sur, elev 1701 ft, pb fr 2025 ft to 2002 ft, used acid twice, abnd.

Fisher County—Browning & Baker's O. R. Burnham 1, sw sw se sec 4, blk R, W. E. Richardson sur, elev 1839 ft, abnd 3220 ft.

Irion County—Moore Exploration Co., Inc.'s V. P. Tippett-Wardlaw (Conoco) 1, 3905 ft fr s and 990 ft fr w lines of R. Rodriguez sur No. 1803, abnd 1208 ft.

Jones County—J. H. Sprouls et al's J. Nichols 1, 668 ft fr n and 150 ft fr w lines of north 160-ac of east 215-ac of T&P sec 47, blk 16, broken oil pay (Tannehill), 1778-96 ft, pumped 15 bbls oil and 3 bbls water initial.

Scurry County—Forest Dev. Corp.'s J. J. Koonsman 1, c nw sw H&TC sec 217, blk 2, elev 2118 ft, abnd 5004 ft.

Taylor County—Forest Dev. Corp.-Carl King Drl. Co.'s T. C. Anderson 1, nw ne sw sec 8, Lunatic Asylum Lands, td 3546 ft, pb to 3390 ft, used acid in Palo Pinto lime 3369-90 ft, abnd.

SOUTH TEXAS

FIRST REPORTS

Blanco County—H. C. McCart's Lester 1, 1600 ft e line, 1400 ft n line of Antonio Band-Rando sur 161, lcn.

Cameron County—V. D. Wedegartner, Tr's Sams-Porter 1, 950 ft n line and 260 ft e line of blk "D," San Pedro de Carricitos gr., lcn.

Duval County—Texas-Inland Oil and Gas Co.'s Nueces Land and Livestock Co. 1, 220 ft s line, 1320 ft w line, BS&F sur 175, lcn.

Goliad County—H. R. Cullen's Pettus 1, from point where nw line 1197.6 ac intersects San Antonio River, 7408 ft se to that line, thence 360 ft e and slightly s of river, Maria de Jesus y Bravo gr, lcn.

Guadalupe County—Burton, Garvin & Womack's Kendall 1, 310 ft sw line, 1180 ft se line of 189 ac tr, Emanuella de las Santos Coy gr, lcn.

Jim Wells County—Parr Drilling Co.'s Carter 1, 466 ft n line, 466 ft w line, blk 4, L. B. Lancaster Farm Lot subd, lcn.

Webb County—Interstate Minerals & Edgar Younger's R. Lopez 1, 330 ft n line, 240 ft e line, blk 44, sur 309, lcn.

Zapata County—C. M. Leake's Vela 1, 150 ft n line, 330 ft w line of blk 1, subd of sec 5, T&NO RR sur Ab-318, lcn.

COMPLETIONS

Brooks County—Southern Minerals Corp.'s T. C. Procter 1, 330 ft s line and 330 ft e line of sec 20, blk 2, Los Olmos y Loma Blanca sur, abnd 7726 ft.

Duval County—H. J. Porter and J. B. Blanchard's Ira G. Yates 1, 2310 ft s line, 330 ft w line, J. Poitevent sur 326, abnd 3910 ft.

Guadalupe County—Frank H. Glenn's Appling 1, 160 ft nw line, 1000 ft sw line of 54 ac lse, Robert Hall sur, 450 ft derrick floors, top Austin chalk, 1946, top Buda 2182, top Edwards 2375, pb td 2225 ft in Buda, pumped 96 bbls on first test, now pumping 18 bbls.

Jim Hogg County—G. W. Johnson and J. A. Robinson's Rosa Palacios 2, 495 ft e line, 330 ft s line, blk 10, sur 230, abnd 434 ft.

McMullen County—Boysen & Jones' Hagist 1, 330 ft s line, 1320 ft e line sw¼ BS&F sur 127, abnd 2054 ft.

Webb County—Houser & Campbell's M. D. Slator 1, 330 ft s line and 330 ft e line blk 94, Borego gr, abnd 1818 ft.

Williamson County—L. B. Burnette, Jr.'s Reed 1, 1356 ft n line, 1835 ft w line of 400 ac lse, E. Leichtle league, abnd 1145 ft.

NORTH TEXAS

COMPLETIONS

Archer County—P. C. Burns et al, N. Andrews 1, 750 ft fr s and 150 ft fr w lines blk 1, G. C. Farley sur A-129, Gunsite lime 917-20 ft, saturated lime 921-25 ft, pumped 102 bbls initial.

Clay County—Charlotte Montgomery et al's C. T. Woodward 1, 1100 ft fr s and 1900 ft fr e lines ne¼ sec 17, MEP&P Ry. sur, trace o&g in broken sand 1470-75 ft, abnd in shale 1690 ft.

Haskell County—Sawyer Drl. Co.'s A. J. Rowland 1, 330 ft out of nec sec 5, blk 3, H&TC sur, top Caddo 4640 ft, used acid through gun-perforations, abnd 4640 ft.

Throckmorton County—Beacon O&G Co.'s E. Hawes 1, 1400 ft fr n and 466 ft fr w lines sec 979, TE&L Co. sur, top Marble Falls 4375 ft, abnd 4515 ft.

Wilbarger County—Humble's B. D. Baker 1, sw nw se H&TC sec 31, blk 9, abnd 2993 ft.

Young County—C. W. Clark et al, H. M. Goss 1, 450 ft fr n and 650 ft w lines sec 1592, TE&L Co. sur, broken sand 1184-92 ft, oil sand 1200-07 ft, pumped 4 bbls initial.

TEXAS GULF COAST

FIRST REPORTS

Brazoria County—Housh & Thompson's Allen 1, Iowa Colony area, c of w 10-acres of sw 20-acres being lot 20-B in K. Ehrman sur No. 12, lcn.

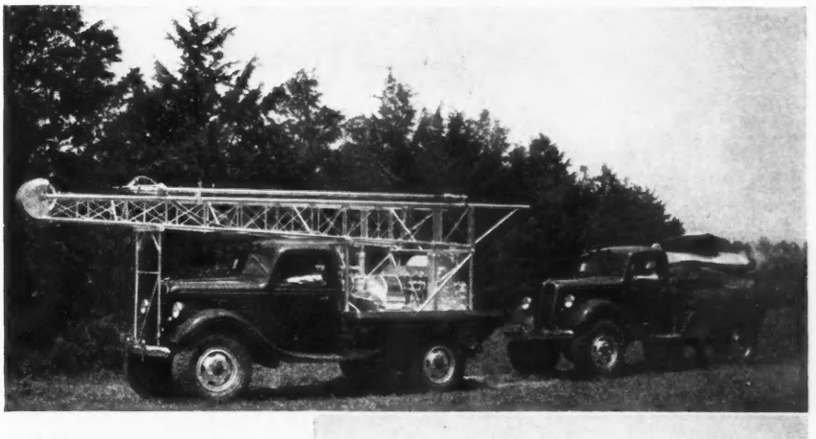
WYOMING

FIRST REPORTS

Natrona—Richland Corporation's State 1, csw nw 36-36n-81w, 17 mi northwest of Casper, mim.

MARMON-HERRINGTON

All-Wheel-Drive



in any size or type of vehicle you may need

☆

In oil field service there is need for more different types and sizes of automotive equipment, perhaps, than in any other industry. Mammoth big fellows *with traction and power on every wheel,* to haul the heaviest rigs and equipment to location, no matter in what out of the way place it may be. Lighter *all-wheel-drive* trucks to bring in tools and supplies through deep sand, mud or snow. Station wagons to transport executives and crew to and from the field. Marsh Buggies to traverse swamps and marshes. Mounts for seismograph scouting, out beyond the horizons of travel.

MARMON-HERRINGTON has them all. They're all *all-wheel-drives,* from smallest Ford pickups and passenger cars, converted to *all-wheel-drive,* to tremendously big trucks, with power and traction on four or six wheels, capable of hauling 25-ton loads over the worst kind of going. Tell us what you need, and let us send literature. Cable Address MARTON.

MARMON-HERRINGTON COMPANY, INC.
INDIANAPOLIS, INDIANA, U.S.A.

NOTES FOR THE Equipment Buyer and User

Drill Pipe Slips

THE NATIONAL SUPPLY COMPANY

Two new types of drill pipe slips with 3-piece hinged construction have been recently introduced by The National Supply Company. They are designated as the Ideal "SK" and "BK" Slips, the former being offered for handling average length strings of drill pipe and the latter for extra long strings. The Type "BK" Slips are extra long and have been used successfully on some of the world's deepest wells.

Both types feature renewable liners with machined wickers. The liners of the "SK" Slips have a 13-inch long gripping surface and the "BK" Slips have an 18-inch long gripping surface. The 3-piece hinged construction permits practically a full grip around the pipe with a uniform bearing pressure that minimizes scoring of the pipe. This type of construction also assures uniform seating of the slips in the table bushing. A major part of the liner backing is effective and the backs are made extra wide to prevent grooving of the slip bowl.

These new National Slips are constructed for long life. Both the liners and the bodies are of alloy steel, heat treated to improve their wear-resistant qualities. The liners are held in the bodies by large alloy steel bolts and can be quickly replaced.

The Type "KS" Slips are adaptable for use in any table bushing. The extra long "BK" Slips are designed for use with the Ideal Type "B" Table Bushing which has an unusually deep slip bowl; however, they can be used in any standard table bushing when used with an adapter.

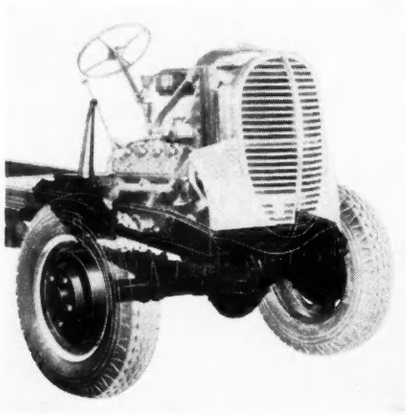
Ideal "SK" Slip

Ideal "BK" Slip

All-Wheel-Drive

MARMON-HERRINGTON COMPANY

Without sacrificing any of the standard Ford Truck's speed, maneuverability and economical operation, Marmon-Herrington Company, Indianapolis, Indiana, converts all 1939 standard Ford models to all-wheel-drive. Thus, the effective traction is practically doubled,



Marmon-Herrington All-Wheel Drive Ford Truck Chassis.

and the work range of the truck is widened to take in classes of service entirely beyond the capacity of conventional drive vehicles. Even the extraordinary ability of the crawler type tractor is exceeded for many kinds of work, where great tractive power must be coupled with speed and maneuverability, according to the manufacturers.

To accomplish these results at low cost, the company takes advantage of the production facilities and volume of the Ford Motor Company. Regulation Ford trucks are brought into Marmon-Herrington plants, where the same engineers who build the Marmon-Herrington line of heavy duty all-wheel-drive trucks make the changes in the chassis as shown below.

A driving front axle is installed.

A two-speed auxiliary transmission or transfer case is installed.

All other parts necessary to the conversion of the standard Ford V-8 truck into a genuine all-wheel-drive unit are installed.

Every Marmon-Herrington All-Wheel-Drive Ford V-8 is thoroughly tested by experienced Marmon-Herrington engineers.

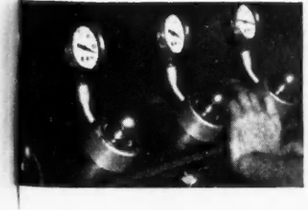
The driving front axle is of exclusive Marmon-Herrington design. The auxiliary transmission in combination with the standard four-speed Ford transmission gives a total of eight speeds forward and two reverse, a high range of speeds for regular highway service, with no loss of the standard Ford road speed or ability, plus a tractor range of speeds for heavy duty, cross country work. The One-Tonner has four speeds forward and one reverse.

These changes, which convert a regu-

THE HARD STEEL HEART OF AN AXELSON PUMP

TWENTY-SIX THOUSAND TIMES A DAY the balls in a deep well pump rise in the cage and come down smack on the valve seat. The seal must be perfect at every stroke in spite of sand, sulphide, salt water, shale and wear. Silently and unseen, your pump lifts oil according to the quality of its valve seats and balls. Every Axelson Ball is individually lapped to its mating valve seat, and must not leak air under a high vacuum test. Four types of Axelson Seats with regular, Haystellite, Monel Metal or Bronze Balls provide for every well condition. Axelson Stainless Steel Balls must not vary more than twenty-five millionths of an inch from perfect roundness and size. This precision, together with the quality of the metal and the methods of manufacture accounts for the non-slip seal that gives long productive life and low cost lifting.

Axelson Seats and Balls are individually lapped in this Axelson-designed machine that applies many compound motions under uniform pressure and time control.



Every Axelson Seat and Ball assembly is individually tested under a practically perfect vacuum, held for a sufficient time to show no leakage. As air is thinner than oil, this test is final proof of fitness.

AXELSON MANUFACTURING CO.

P.O. Box 98, Vernon Station, Los Angeles • St. Louis • 50 Church St., New York • Tulsa • Mid-Continent and Eastern Distributor: Frick-Reid Supply Corp. • Rocky Mountain Distributor: Great Northern Tool & Supply Co. • Foreign Representatives: "COSMOS" Soc. in Nume Colectiv, Bucharest, Roumania • Direct Factory Representative, Bucharest, Roumania • Industrial Agencies, Ltd., San Fernando, Trinidad, British West Indies • Factory Representative, Maracaibo, Venezuela • Armco International Corp., Buenos Aires, Argentina.

AXELSON SELLS & SERVICES

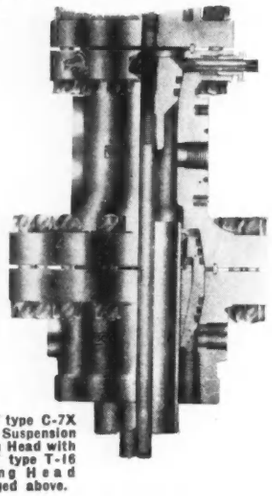
DEEP WELL PLUNGER PUMPS

AND SUCKER RODS

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

O-C-T SLIP SUSPENSION CASING HEAD permits drilling, running and cementing casing and hanging casing at any desired point through oversize flanged blowout preventer equipment. Last joint of casing is cut off above hanger and welded thereto as shown below . . . no special length joint of casing is required. T-16 Tubing Head flanged above Casing Head, as shown below, permits drilling in and running and landing tubing through blowout preventer equipment. Lock down screws force hanger into sealing position before removal of preventers.

Full particulars gladly sent on request.



O-C-T type C-7X Slip Suspension Casing Head with O-C-T type T-16 Tubing Head flanged above.

OIL CENTER TOOL CO.

QUALITY O-C-T PRODUCTS

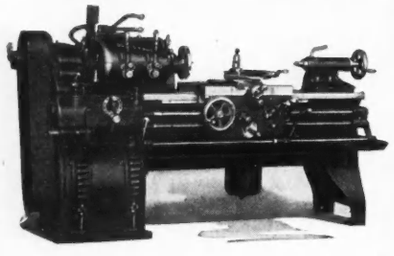
HOUSTON, TEXAS, U.S.A.

CABLE ADDRESS "OCENTOL"

Sold Through Supply Stores

BOYE & EMMES

Engine Lathe



The above lathe is latest improved type, with Timken Zero Precision Taper Roller Bearings, and other exclusive features.

COMPLETE LINES

Machine Tools—Metal Working Machinery—Bolt and Pipe Threading Machines—Arc, Spot, and Butt Welders—Hand Power and Electric Traveling Cranes—Material Handling Equipment—Foundry Equipment—Forge Shop Equipment—Hydraulic and Pneumatic Punches and Presses—Eclipse Counterbores.

D. S. MAIR

MACHINERY CORPORATION

HOUSTON, TEXAS

4000 Clay Ave. Telephone Fairfax 1466

Stanley Mair

DALLAS, TEXAS

235 Allen Bldg. Telephone 7-2874

Charlie Harter

NOTES FOR THE Equipment Buyer and User

lation Ford V-8 truck from two-wheel drive to all-wheel-drive, are in no sense an "accessory" operation. Engineering and mechanical skill of the highest order is required, and special machinery and equipment are necessary.

Block

McKISSICK PRODUCTS CORPORATION

McKissick Products Corporation, Tulsa, has developed a new swabbing and bailing block. This is designed for high speed and durability. It is provided with sealed automatic lubrication, and comes equipped with a ball bearing swivel assembly, which permits it to swing free under load.

Two bearings are set on either side of the sheave.

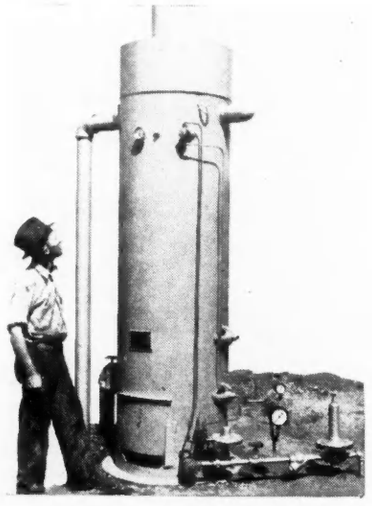
The block may also be used as a traveling block or floor block for handling tubing or rods in shallow fields.

McKissick Block

Vertical Treating Heater

BLACK, SIVALLS & BRYSON

Providing a practical and inexpensive method of heating moderate quantities of cut oil where the requirements are not too severe, Black, Sivalls & Bryson, 430 S. Rockford, Tulsa, Oklahoma, has developed an improved vertical treating heater.



Vertical Treating Heater

The heater has vertical fire tubes surrounded by a fluid, much like a vertical steam boiler, which are heated from a fire box directly beneath the fire tubes.

The main feature of the heater is the mud ring section surrounding the fire box. Incoming fluid is admitted near the bottom of the mud ring to assist in preventing sediment deposits on the bottom flue sheet. For cleaning the mud ring section and bottom flue sheet, cleanout handholes are provided.

The vertical heater requires little space, being small and compact. No concrete base or piers will be necessary if it is set on level ground. It gives very satisfactory service when the fluid to be heated is not corrosive and contains no lime or salt-forming properties.

Standco

NO-SMOKE

STANDCO BRAKE LINING

Nothing novel—no bunk—but it gets the job done without scoring brake rims. See page 2100, Composite Catalog.

Standard Brake Lining Co.

NOTES FOR THE Equipment Buyer and User

Tractor

CATERPILLAR TRACTOR COMPANY

A new 25-horsepower tractor, the R2, has been announced by Caterpillar Tractor Company, Peoria, Illinois.

Designed to operate economically under all conditions, the tractor features an engine with optional fuel systems—high compression for burning gasoline, moderate for using various grades of tractor fuels.

The 4-cylinder engine has a bore and stroke of 3¾ x 5 inches and turns at 1525 r.p.m. It has a 5-bearing crankshaft, replaceable alloy iron cylinder liners and forced-feed lubrication to all working parts.

Completely modern in both mechanical design and appearance, the R2 is the most efficient 25-horsepower spark ignition tractor ever offered by the company, and is the product of more than 15 years of building tractors in this power class.

To increase the general working ability of the new tractor, and to cut as much as 20 to 40 percent off of normal working time, a 5-speed transmission has been provided. This is designed to offer the correct working speed for every type of job that the machine will encounter.

A low gear of 1.7 m.p.h. gives a drawbar pull of 5960 pounds. Second gear is 2.5 m.p.h.; third, 3.0 m.p.h.; fourth, 3.6 m.p.h. The high gear of 5.1 m.p.h. is designed for rapid travel from job to job, and for the lighter loads.

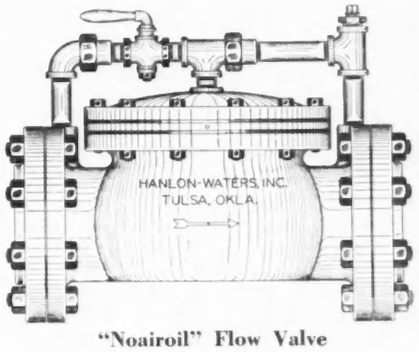
It is an ideal unit for the hauling of supplies and other equipment.

The new machine, with greater steering leverage, has finger-tip ease of operation. The master clutch is hand operated, and there is a roomy, comfortable, full-upholstered seat.

Tank Flow Valve

HANLON-WATERS, INC.

Hanlon-Waters, Inc., Box 1559, Tulsa, announces the "Noairoil" tank flow valve for oil field run tanks, designed to handle the flow of sweet or corrosive oil from a single tank or a battery of tanks to a pipe line system. The valve requires a positive liquid-pressure head on the inlet side to cause the inner valve to open, irrespective of whether



"Noairoil" Flow Valve

the outlet side discharges into a pressure or a vacuum. In case of a vacuum being created on the outlet side, the higher this vacuum becomes the tighter the valve will seat, thereby preventing pulling vacuum on the tank. Whenever pressure builds up on the outlet side, it causes the inner valve to close and thereby prevent back flow into the tank with possibility of overflow.

Advantages claimed for this valve by the manufacturer include: Positive minimum level shut off; maintains positive pressure in tank under all conditions of flow; no reversal of flow, eliminating run-line check valves; reduction of pipe corrosion by preventing flow of air into gathering system; no floats; no trigger work; no stuffing boxes; no flapper valve; no adjustments; fully automatic; cannot freeze; cannot air lock; replaceable seats; integral manual air release and by-pass; no air or gas release hazard; reduces running time, gathering station pumping cost and labor expense; eliminates gravity and volumetric losses by air being pulled into gathering line, and no oil is too heavy or too light to be handled by the flow valve.

Turbines

The Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., has released a booklet on the Type M turbine. Diagrams and sketches illustrate the many applications of the turbine, and the methods of obtaining an unusual degree of flexibility in its speed and power characteristics.

Water Cooling

The Marley Company, Kansas City, Kansas, is circulating a brochure describing a portable engine water cooling unit in which fan and pump are driven by a single electric motor, gas or gasoline engine. Units are available in four sizes.

Tubular and Flat Rolled Products

A. M. Byers Company has published its 1939 general catalog, which has 55 pages of general information, illustrations and specification tables on the manufacture and use of wrought iron and steel tubing, casing, special purnose pipe, tank heads, roofing, sheeting, and structural members.

WILL BUY
Used Oil Well Supplies

Anywhere, anytime, any amount.

We also pay highest prices for
PIPE PROTECTORS

Call us for an estimate.

RELIABLE SUPPLY CO., Inc.
3645 Jensen Drive, Houston, Texas
Box 2715 Phone C-9448
N. Perel, Manager

For Controlling Low Pressure Wells

BREWSTER Model 3-T Adjustable Flow Bean

This economical flow bean has been specifically designed for prorating and controlling those wells in low pressure areas. 1" graduated choke fitted with accurate indicator scale. 3000-pound test. Write for prices and special quantity discounts.

The BREWSTER CO., Inc.
Phone 2-3181 Shreveport, La.
New Iberia - Houma - Lake Charles - Rodessa

DRAGON COMPOSITION CUPS

Users Know Dragon Valve and Pump Cups are Built for the "Longer Run"

Dragon Composition (for deep wells); Nobs Composition (for shallow), and Dragon Leather Cups save **profits, lost time** and **headaches,** because they perform longer—more dependably. Specify "Dragon"—built by cup specialists, since 1912.

"On Duty or in Competition—as Fearless as the Dragon"

The Dragon Mfg. Co.
Marietta, Ohio

NOBS COMPOSITION CUPS

NOTES FOR THE Equipment Buyer and User

W. G. Fitzpatrick Sales Manager The Continental Supply Company

The Continental Supply Company announces appointment of W. G. Fitzpatrick as manager of sales, with headquarters at Dallas, Texas, effective February 20.

Fitzpatrick has had a long and extensive career in the oil well supply business. After studying engineering at Carnegie Institute of Technology in Pittsburgh, he served as a commissioned officer in the U. S. Marine Corps during the war. In 1919 he became associated with The National Supply Company by whom he was employed until 1928. He then joined the sales staff of Emsco Derrick and Equipment Company and was subsequently promoted to the position of sales manager in charge of Emsco activities in the Mid-Continent. In 1933 he became a sales representative for The Continental Supply Company with headquarters in Houston, where he served until his present appointment.

W. G. FITZPATRICK

New!
LINE SCALE
Packer Junior Model

especially designed for light rigs and coring . . .

This is the newest member of the famous Line Scale family . . . designed for jobs not exceeding 75,000 lbs. This model like all Line Scale models is super - sensitive and rugged enough to withstand the hardest usage. Absolutely ACCURATE at all times—functions perfectly under all weather conditions. Easily installed, and when once properly adjusted gives uninterrupted service.

"JUST READ THE DIAL"

See Composite Catalog, page 1341, for complete details of Line Scale models.

Line Scale Co. Inc.

907 S. E. 29th - 2-1765 - P. O. Box 4139

OKLAHOMA CITY, OKLA.

Inventor of Gas Burner Joins Coppus Engineering Corporation

Edwin L. Dennis, for 12 years chief engineer and consultant for Godchaux Sugars, Inc., New Orleans, La., is now connected with Coppus Engineering Corporation of Worcester, Mass., in the capacity of chief combustion engineer.

He is a graduate of the L.S.U. School of Engineering and prior to his position at Godchaux Sugars, Inc., was power engineer for The Texas Company, Ardis Works, Shreveport, La.

Dennis is the inventor of the Coppus-Dennis Fanmix Rotary Gas Burner now manufactured by Coppus Engineering Corporation.

Lane-Wells Sales Executives Expect New Record in 1939

A general sales convention of Lane-Wells Company officials and executives was held recently in Los Angeles. Under the direction of Walter T. Wells, president and Rodney S. Durkee, executive vice president, the record of the past year's sales was reported and plans made for the coming year.

1938 sales were the highest in the history of the company with the outlook for 1939 to exceed that record. An equipment construction program to meet the increasing demand for Lane-Wells Services was outlined.

M. E. Montrose and M. T. Higgs, Gulf Coast division manager and sales manager; R. B. McCullar and C. T. Casebeer, Mid-Continent division manager and sales manager; J. W. McPhee, California division manager and D. M. Anderson, California electrolog superintendent, represented the respective company divisions. N. L. Dorn, chief engineer; C. H. Barnes, production engineer and F. R. Shumack, assistant to the vice president attended the sessions which were held at the California club.

Speed Reducers for Economy and Exact Reduction

Westinghouse Types SH and DH speed reducers, used with all prime movers such as electric motors and gas, oil or Diesel engines, and suitable for any application where economy of power transmission and exact speed reduction are important, are extensively described in an illustrated booklet published by the Nuttall Works, Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

The standard gear ratios range from 2.82:1 to 70.5:1 and capacities from one to 500 horsepower affording a standard gear unit for almost any application and speed. Type SH is a single-reduction unit, with 13 standard ratios ranging from 2.82:1 to 9.5:1 available in each size, and Type DH is a double-reduction unit, with 15 standard ratios ranging from 11.8:1 to 70.5:1. Special ratios can be furnished with either type.

Copies of this booklet, Descriptive Data 3620, may be secured from headquarters at East Pittsburgh, Pennsylvania.

Chaser Grinders

Landis Machine Company, Waynesboro, Pennsylvania, has just released Bulletin A-87-1 on grinding machines suitable for maintaining the chasers in die-head threading machinery at maximum efficiency.

Sand Pumps

Oil Well Supply Company, Dallas, Texas, has prepared Bulletin No. 170-A descriptive of Superior Sand Pumps. The bulletin illustrates regular and heavy duty type pumps and lists sizes and weights of pump parts.

It's a . . .

KEYSTONE

You want, if you are interested in a good drilling machine; a good cleaning-out machine; or general purpose machine, let us know your needs, we'll gladly quote you on suitable equipment.

There are Keystone portable machines for all work to 4000 ft.

TRADE MARK KEYSTONE REGISTERED U.S. PATENT OFFICE

Keystone Driller Co.

BEAVER FALLS, PA.

JOPLIN, MO. WAUKEGAN, ILL. ARLINGTON, N. J.

NOTES FOR THE Equipment Buyer and User

H. A. Barnes Joins Bethlehem-International in Oklahoma

H. A. Barnes has been appointed sales engineer for Bethlehem-International Supply Company, Tulsa. His territory will be northern Oklahoma. Barnes was with Parkersburg Rig & Reel Company from 1932 until he accepted the new position February 21.

Olympic Products Opens District Office at Houston

Consolidation of Olympic Engineering Company and Olympic Rubber Company into a new concern under the name Olympic Products Company recently was announced. The new company has established a maintenance plant at 7402 Navigation Boulevard, Houston, and has completed moving in necessary machinery, which work has been done under the supervision of Roy Renouf, one of the partners owning the company. Renouf returned to California this week to company headquarters in Los Angeles.

R. Vern Stout has been appointed district sales manager for the company, working out of the Houston office in the Texas Gulf Coast, Louisiana and Arkansas. The company manufactures a wide line of packers, line spoolers, cement equalizing guides and rubber products.

Hunt Oil Tool Company, Houston, has been appointed exclusive distributor for Olympic Products Company in Louisiana, Arkansas and Texas Gulf Coast, and will supply the trade with Olympic products through stores located in the various territories mentioned.

Earl Rees Making Trip to South America

Through Mexico, then south along the east coast of South America to Argentine, then north across the Andes, goes Earl Rees, sales manager for Fluid Packed Pump Company, on his first foreign air trip. At Maracaibo Rees will change planes to make a circuit into all the producing fields of South America and all the oil company headquarters offices to confer with various officials and engineers. He plans to make a complete photographic record of the trip with new camera and equipment that has been purchased especially for the flight.

EARL REES
Fluid Packed Pump Company sales manager on South American trip.

H. A. BARNES
Joins Bethlehem-International Supply Company as Sales Engineer.

Lloyd G. Ensign Plans Extended Trip Through South America

Lloyd G. Ensign, export representative of a number of American oil equipment manufacturers with headquarters at New York, plans to leave March 1 for a three-months trip to Cuba, Trinidad, Venezuela, Colombia, Ecuador, Peru and possibly Brazil.

Goodyear to Celebrate Centennial with Homecoming

Celebrating the one hundredth anniversary of the discovery of vulcanization by Charles Goodyear in 1839 and the fortieth anniversary of their company, representatives of the Mechanical Goods Division of The Goodyear Tire & Rubber Company were guests at the Akron, Ohio, factories February 20-23 in a gigantic homecoming.

Highlights of the combined homecoming and centennial celebration, which was attended by 2000 Goodyear sales representatives from all parts of the world were: Unveiling and dedication of a statue of Charles Goodyear; a "rubber world's fair" of rubber products and historical materials in Goodyear Hall; civic dinner sponsored

REED'S 'B-R' DRILLING BIT WITH WIRE LINE RETRACTABLE CORE BARREL

ANY NUMBER OF CORES CAN BE TAKEN (REGARDLESS OF DEPTH) WITHOUT REMOVING THE DRILL PIPE

HARD FORMATION HEAD (Interchangeable with Soft Formation Head)

REED 'B-R' Drill Collar and 3-Blade Drilling Bit with Core Barrel in position

REED ROLLER BIT CO.

10 NEW FEATURES

NO INCREASE IN PRICE!

The New Simplex No. 310A Emergency Jack gives you:
1" Greater Lift.
10 Sq. Inches Larger Base Area.
Larger, Wider Rack Bar Toe Lift.
Foot-Controlled Tilting Hook.
37% Easier Lifting.
Same Rack Bar Efficiency Used Straight or Tilted.
Greater Rack Bar Gib Slide Bearing.
Triple-Toothed Lifting and Retaining Pawls.
Greater Overload Capacity.
More Convenient Carrying Handles.
Now better than ever for oil field use.
ASK YOUR FIELD STORE
TEMPLETON, KENLY & CO., CHICAGO

SIMPLEX
GOLD MEDAL AWARD SAFETY JACKS

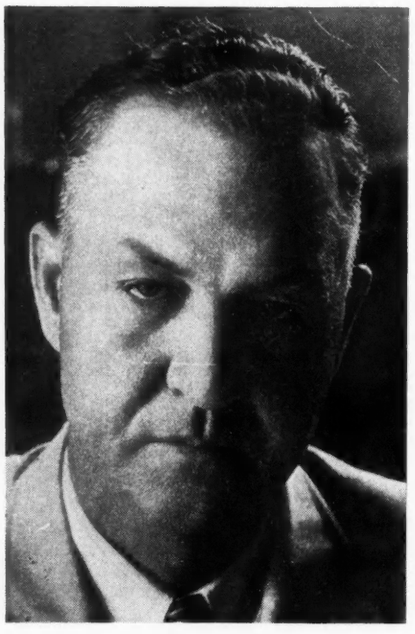
NOTES FOR THE Equipment Buyer and User

by Arkon Chamber of Commerce for 1600; nationally known speakers.

Importance of Goodyear's discovery is illustrated by latest available figures on employment and consumption of raw materials by the rubber industry today in manufacturing such well known products in addition to tires as transmission and conveyor belting; rubber floor and wall covering; printers' supplies; soles and heels; mattresses and seat cushions; boots and shoes; electrical equipment; water-proof, transparent wrapping materials; myriad sundries and novelty items.

World wide employment in the growing collecting, processing and distribution of finished rubber goods totals more than 4,000,000. Cotton consumed in the manufacture of rubber products totalled 375,000,000 pounds in 1936, making the industry one of cotton's biggest customers. Value of numerous other raw materials required in rubber manufacturing the same year was estimated at $57,000,000, were produced in 35 states.

Retail value of rubber products sold in the United States in 1937 was $1,248,000,000, or approximately 50 percent of the world's total. Investment in the rubber business is estimated at $2,698,000,000.



S. T. CHILDRESS

California Association to Meet at Houston Oil Show

Oil men and oil tool manufacturers and representatives from California together with ex-Californians now engaged in any branch of the oil business in other states have been invited to attend the California dinner to be held in connection with the Oil-World Exposition at Houston, from April 24 to 29, inclusive. Approximately 250 are expected to attend this dinner which is being arranged for by the California Committee.

At a meeting of this committee, plans were formulated to make suitable preparations for the event. According to S. T. Childress, chairman, letters will be sent to all exhibitors in California and to all ex-Californians now residing in and around Houston, informing them of the dinner and requesting that they make their reservations immediately so that the matter of finances may be taken care of properly. The date set for the dinner is Friday, April 28.

The committee consists of S. T. Childress, chairman; H. J. Craig, Baash-Ross Tool Company; Paul Hubbard, Gulf Oil Corporation; C. F. Bedford, Stanolind Oil & Gas Company; W. W. Scott, Humble Oil & Refining Company; D. B. Collins, Shell Petroleum Corporation; Chase E. Sutton, Pure Oil Company; John R. Suman, Humble Oil & Refining Company and Ed Lenzner, general manager, Oil-World Exposition. Those men from California not receiving notice and desiring to attend the dinner may communicate with S. T. Childress, Rio Bravo Oil Company, 913 Franklin, Houston, or with any of the above members.

James Martin Promoted In Hewitt Organization

Hewitt Rubber Corporation, Buffalo, announces promotion of James Martin from plant night superintendent to assistant factory manager. His new duties will include the coordination of production, mechanical and technical problems in all factory divisions under the direction of E. K. Twombly, vice president and treasurer.

Martin came to Hewitt in 1925 starting as clerk in the cost department. In 1928 he was transferred to production and was successively foreman of several departments and then division superintendent. More recently he has acted as night superintendent of the entire plant.

Marmon-Herrington Has Biggest Month In History

Last year when the truck industry as a whole showed a considerable recession, Marmon-Herrington Company, Indianapolis manufacturers of All-Wheel-Drive Trucks failed to follow the trend of the industry and enjoyed a business on a par with that of the profitable year of 1937.

"Our business for 1938 was very satisfactory," says Bert Dingley, vice president, "with expansions in our dealer organization and a substantial increase in our advertising, we succeeded in showing gains throughout the year. Even more aggressive plans have been made for 1939 and we are very optimistic about the future.

"January of 1939 produced the biggest month's business this company has ever enjoyed and it is attributed by us to the rapidly growing appreciation of the type of vehicles we manufacture, by engineers and contractors, oil men, loggers, highway commissioners and others who have the most difficult hauling jobs to do over all sorts of terrain on and off the highway."

REGISTERED PROFESSIONAL ENGINEERS
GAS AIR WATER
REPRESSURING
INSTALLATION OPERATION
PETROLEUM ENGINEER
JO H CABLE
WICHITA FALLS TEXAS
GAS MEASUREMENT PERMEABILITY
COMPRESSOR PLANTS POROSITY
BOTTOM HOLE PRESSURE SATURATION
GAS OIL RATIOS RECOVERABLE OIL
CONTROL OF FLOW THRU FORMATION
REGISTERED PROFESSIONAL ENGINEERS

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As envelope suppliers to leading concerns in the Southwest, we solicit your business on the basis of proved dependability, quality workmanship and ability to effect worthwhile economies. May we quote on your next order?
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SAVE MONEY...
with the
LAMB
Rod Line Jack and Safety Hook-Off
Avoid injuries — save time. This equipment eliminates turn buckles, C-links, four combination clamps, knock-off block, rod line jack, and the pick-up links.
DURABLE . . . EFFICIENT . . . SAFE
ILLUSTRATED FOLDER ON REQUEST
THE JONES OIL CO.
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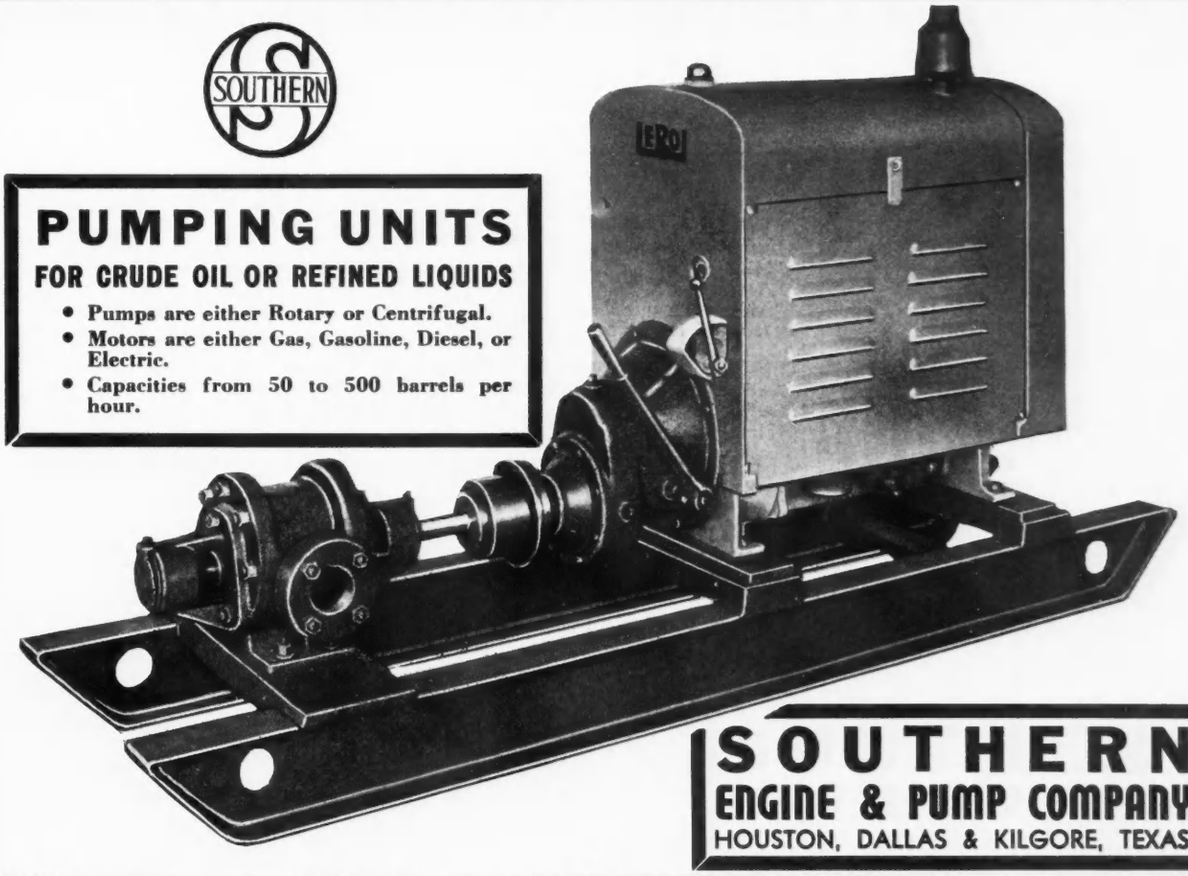
SOUTHERN

PUMPING UNITS

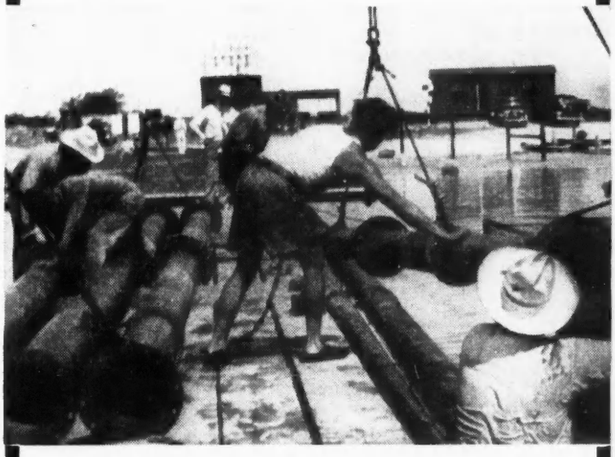
FOR CRUDE OIL OR REFINED LIQUIDS

- Pumps are either Rotary or Centrifugal.
- Motors are either Gas, Gasoline, Diesel, or Electric.
- Capacities from 50 to 500 barrels per hour.



SOUTHERN ENGINE & PUMP COMPANY
HOUSTON, DALLAS & KILGORE, TEXAS

MOLOX BALL & SOCKET CENTRIFUGAL C. I. PIPE



THIS typical construction scene shows 8" Molox Ball & Socket Pipe replacing a submarine pipe line of substitute material 8304 feet long which failed on the job of conveying high-pressure gas across Galveston Bay, Texas.

Although operating pressure will not normally exceed 100 lbs., the Molox Ball & Socket Pipe line was designed to carry 250 lbs. For literature on this Cast Iron Pipe which permits extreme deflection while carrying liquids or gas at high pressure, address Acipco office nearest you.

AMERICAN CAST IRON PIPE CO.
BIRMINGHAM, ALA.
Dallas Houston El Paso Pittsburgh Kansas City Chicago
Minneapolis New York City Cleveland Los Angeles San Francisco

DOWN goes your wrench expense with the rugged guaranteed RIDGID

No housing repairs with this famous all-alloy pipe wrench—and that means practically no wrench upkeep expense at all. Bend pipe with a RIDGID, twist it—you won't harm the housing. Adjusting nut won't bind, always spins easily in all sizes, 6" to 60". Sure-action jaws of chrome molybdenum, handy pipe scale on full-floating hook jaw, heel jaw replaceable. Powerful comfort-grip I-beam handle—a safe efficient wrench in any use or emergency, as millions of users can tell you. Made also in End Pattern for pipes against flat surfaces. For real wrench satisfaction and economy, buy RIDGID at your Supply House.

THE RIDGE TOOL COMPANY, ELYRIA, O.

RIDGID PIPE TOOLS

MILLER WILL FIX THAT!

With the sand and sediment removed, production is increased — that's why MILLER Sand Pumps are bringing in more oil dollars throughout the World.

The MILLER is made in diameters of 2½, 3, 3½, 4, 4¼, 5, 5½, 7 and 9 inches and lengths of 20, 25 and 30 feet. 5/32-inch wall thickness in REGULAR Type, ¼-inch wall tubes HEAVY Type Sand Pumps.

INTERCHANGEABLE BOTTOMS
To Meet Every Condition

● BAILER BOTTOM
With the Bailer Bottom installed the MILLER is quickly changed to a Bailer giving you a combination of either Bailer or a Sand Pump in one tool.

● SAND BOTTOM
Used when tools are run and when well is shot to quickly remove loose material.

● STAR BOTTOM
Used for cutting the sand loose.

● CHISEL BOTTOM
(In Pump)
With this bottom tightly packed sand can be easily broken in small pieces so it can be picked up in the pump.

Write for Descriptive Folder and Price List

See Pages 1564-65 COMPOSITE CATALOG

PATENTED
NO. 1370340
NO. 1523408
NO. 1787390
NO. 1862428
NO. 1866828
NO. 2055667

MILLER Sand Pump Co.

General Offices and Factory:
OKLAHOMA CITY, OKLAHOMA
1524 S.E. 29th. P. O. Box 4516 Tel. 7-6884

Branches:

SAPULPA	KILGORE	HOUSTON
Okla.	Texas	Texas
Tel: 341	Tel: 545	Tel: P-2841

FOR SALE BY SUPPLY STORES EVERYWHERE

Squeaks from the Bull Wheel

Parting Gift

"Where'd you-all git dat derby hat?"
"Hit's a surprise fum mah wife."
"A surprise?"
"Ah cums home de odder night unexpected, an' found it on de table."

Grown Up

And what did mamma's little baby learn in school today?

I learned two kids bigger'n I never to call me mamma's little baby again.

Aiming to Please

A clerk in a miscellaneous store was serving a caller. The manager was at a desk some distance away, but he overheard the clerk say: "No, madam, we haven't had any for a long time."

"Oh, yes, we have," interrupted the manager; "I will send to the warehouse immediately and have some brought for you."

The lady went out laughing. The manager turned to the clerk: "Never refuse anything; always send out for it."

"Well, you see," replied the clerk, "she said to me, 'We haven't had any rain lately.'"—

Bright Pupil

"What happened in the year 1809?"
"Lincoln was born."
"Correct. Now what happened in 1812?"
"Lincoln had his third birthday."

Catty!

"I refused Harry two months ago, and he has been drinking hard ever since."

"Well, I say that's carrying a celebration a little too far."

Teething

"My, my, do those notches in your gun mean you've shot that many men?"

"Naw, lady, I ain't no tough guy. That's just where I was chewin' on it kind of absent-minded-like the other day."

Certainly

"Johnny, what is a cannibal?"
"I don't know."
"Well, if you ate your father and mother what would you be?"
"I'd be an orphan."

Sassy Listener

"But, my dear, you've been talking for an hour, and I haven't said a word."

"No, you haven't said anything, but you've been listening in a sassy way, and I'm not going to stand for it."

For Cause

Edith: "So Old Gotrocks' check bounced back?"

Fay: "Yeah, it was marked 'insufficient fun.'"

"At Large"

"Is your son still a member of the army?"

"Ah ain't sho', mam. But Ah knows dey's out lookin' fo' him, so Ah guess he's at least a member at large."

Literal

"What is your occupation?"

"It isn't an occupation, it's a pursuit. I'm a bill collector."

Q.E.D.

"What are the properties of heat and cold?"

"Heat expands and cold contracts."

"Correct. Give an example."

"In summer, when it's hot the days are long, and in winter when it's cold the days are short!"

Lifting the Hat

A young man, not wishing to do anything that was not agreeable to the laws of etiquette, sent the following question to the editor of a Kansas paper: "Please tell me when and where, it is the correct time for a gentleman to lift or remove his hat?"

And here is the reply he received: "Without consulting authorities of etiquette—in fact, giving it to you offhand, so to speak—we would say that at the following times and on the following occasions respectively, that the hat should be removed or lifted as circumstances indicate: When mopping the brow, when taking a bath, when eating, when going to bed, when taking up a collection, when having the hair trimmed, when being shampooed, when standing on the head."

"I'll Alter Him"

What does the bride think when she walks into the church?

"Aisle, altar, hymn."

In Pop's Language

Pop (a Socialist) — "What do you mean by playing hookey, staying away from school?"

Son—"Class hatred, Pop."

Both Seatless Now

"Why, many of us had Stock Exchange seats five years ago, and look at us now."

"Yeah, and many of us had seats in our pants five years ago, but please don't look at us now."

Topheavy Financing

Vainly trying to collect $40 due him from one of his customers, the colored man consulted his lawyer friend.

"What reason," his lawyer asked, "does he give for not paying you this money?"

"Boss," replied the colored gentleman, anxiously, "he's gimme a mighty good reason, sah."

"Well, what is it?"

"He done say, Boss, dat he's been owin' me dat money so long dat de interest has et it all up."

Believe It or Not

"I want to change my name, your honor."

"What is your name?"

"Joe Stinks."

"I don't blame you—what do you want to change it to?"

"Charlie."